PROCEEDINGS OF THE

1927 ANNUAL CONFERENCE

13th

of the

NATIONAL SOCIETY FOR THE

PREVENTION OF BLINDNESS

WW 2330
N21p
1927

C.1

Proceedings of the 1927 Annual Conference

National Society for the Prevention of Blindness
and
Illinois Society for the Prevention of Blindness

Chicago, Illinois
October 13–15, 1927

Co-operating with
Illinois Social Hygiene League
National Safety Council
Illuminating Engineering Society of America
Chicago Ophthalmological Society
State and Provincial Health Authorities of
North America

NATIONAL SOCIETY FOR THE PREVENTION OF BLINDNESS, Inc.
370 Seventh Avenue, New York, N. Y.

Publication 46

Price $1.00

HV2330
N21p
copy 1

Foreword

ALL roads seemed to lead to Chicago from October 13–15, the dates of the Annual Conference of the National Committee for the Prevention of Blindness, held in co-operation with the Illinois Society for the Prevention of Blindness. From Texas, from New York, from Washington, from Massachusetts—in fact, from 18 states and the District of Columbia, including 38 cities—representatives came, sharing the benefits of their experience and knowledge and enthusiasm, and participating in making a well-rounded and well-attended convention.

In addition to the formal meetings there were given twice a day demonstrations of a successful technique used in testing vision of pre-school children, presented by the Staff Associate of the National Committee. Children for the demonstrations were supplied through the courtesy of the Illinois Society for the Prevention of Blindness. Among the audiences reached, all of whom expressed enthusiastic interest in the practical demonstrations, were school medical inspectors and public health nurses of Chicago, in addition to the out-of-town visitors to the Conference.

With the closing of the final meeting of the Annual Conference came the sense of the unity of purpose all over the United States on the part of health, pedagogical and social welfare agencies, official and voluntary, to use their individual and combined forces to prevent blindness and save sight. The most convincing testimony of such purpose was the diversity and number of representatives in attendance, who helped make the Conference an undoubted success from the points of view of increasing purpose and enthusiasm.

Since the National Committee's Conference in Chicago, the name has been officially changed to the National Society for the Prevention of Blindness.

Digitized by the Internet Archive
in 2011 with funding from
Lyrasis Members and Sloan Foundation

http://www.archive.org/details/proceedingsof19200nati

Table of Contents

SECTION I

PAGE

RELATION OF VENEREAL DISEASES TO VISION IMPAIRMENT.... 3

Syphilitic Eye Tragedies and Their Prevention, John Green, M.D..... 8

Early Treatment in Relation to Eye Tragedies, William L. Benedict, M.D..... 12

Bacterial Invasion of the Birth Canal: Its Menace to the Newborn, Edward L. Cornell, M.D..... 19

Discussion: A. J. Chesley, M.D., Hugh O. Jones, M.D., George F. Meyer, Mrs. C. Creswell, Bernard C. Roloff, Bertha M. Shafer, M.D., B. Franklin Royer, M.D., William F. Snow, M.D., Edward Jackson, M.D., John Green, M.D., Lucien Howe, M.D., W. H. Luedde, M.D., Mrs. Mary Dranga Campbell, Alice V. Burdge, E. V. L. Brown, M.D., Edward M. Van Cleve, E. L. Cornell, M.D.

SECTION II

EYE ACCIDENTS IN INDUSTRY..... 45

The Economic Aspect of Industrial Eye Injuries, Stewart J. Owen, Jr..... 46

Discussion: Lewis H. Carris and Stewart J. Owen, Jr.

Preventing Industrial Eye Injuries, Harry Guilbert..... 50

Discussion: H. P. Davidson, M.D., Lewis H. Carris, B. Franklin Royer, M.D.

The Effects of Invisible Radiant Energy on the Eye from the Medical and Research Standpoints, Charles Sheard, Ph.D..... 61

Discussion: George F. Meyer, Charles Sheard, Ph.D., Mr. Ruddy, B. Franklin Royer, M.D., Harry Guilbert, Edward Jackson, M.D.

The Effect and Control of Injurious Invisible Light Rays in Industrial Occupations from the Practical Shop Point of View, J. I. Banash..... 78

PAGE

Discussion: Harry Guilbert, J. I. Banash, Captain R. G. Fisher.

Getting the "Hard-Boiled" Workman to Guard His Eyes, Lewis H. Carris, Chairman 81

Discussion: H. P. Davidson, M.D., Lewis H. Carris, Stewart J. Owen, Jr., James P. Carey, Louis Resnick, Harry Guilbert, Martha Lyon, M.D., J. C. Anderson, M.D., Captain R. G. Fisher, George F. Meyer.

SECTION III*

THE RELATION OF PROPER LIGHTING TO CONSERVATION OF VISION 97

The Correlation of Work for the Prevention of Blindness with Illuminating Engineering, Mrs. Winifred Hathaway .. 99

*Other papers given at this meeting are available upon request from the Illuminating Engineering Society of America, 29 W. 39 Street, New York City.

SECTION IV

NECESSITY OF CORRECTING EYE DEFECTS IN SCHOOL CHILDREN 105

Necessity for Correcting Remediable Eye Defects in Chicago School Children, William H. Wilder, M.D. 107

Discussion: Harry S. Gradle, M.D., B. Franklin Royer, M.D.

Necessity for Correcting Remediable Eye Defects in Philadelphia School Children, Walter S. Cornell, M.D. 118

Discussion: John Green, M.D., Paul D. Mossman, M.D., Mrs. Francis W. Little, Miss Adeline Riefling, Harry S. Gradle, M.D., Lucien Howe, M.D., George F. Meyer, D. P. MacMillan, M.D., Edward Jackson, M.D., William F. Snow, M.D., William H. Wilder, M.D.

SECTION V

PREVENTION OF BLINDNESS FROM THE STANDPOINT OF THE OPHTHALMOLOGIST 133

Ophthalmology in Relation to Prevention of Blindness, Edward Jackson, M.D. 134

Discussion: Robert H. Buck, M.D., H. W. Woodruff, M.D., William H. Wilder, M.D., Edward Jackson, M.D.

Section VI*

I. Sight-saving Classes—Their Rôle in Conservation of Vision

II. Luncheon Conference.—Medical and Pedagogical Administration of Sight-Saving Classes

*This Section is published separately as an issue of the *Sight-Saving Class Exchange*, No. 17, December, 1927, and can be secured from the National Society for the Prevention of Blindness upon request.

Section VII

Page

Trachoma as a Public Health Problem 151

Prevalence of Trachoma Among Appalachian Mountaineers and the Co-operation Plan of Relief between United States Public Health Service and State Health Departments, Paul D. Mossman, M.D. 155

Trachoma in Palestine, C. F. Wilinsky, M.D. 162

Discussion: William H. Wilder, M.D., C. F. Wilinsky, M.D., B. Franklin Royer, M.D.

Minnesota's Plan for Using Indian Nurses, A. J. Chesley, M.D. 168

Trachoma as a Public Health Problem: Wisconsin's Plan of Supplying Public Health Nurses, C. A. Harper, M.D. 171

A Trachoma Survey, Charles H. Halliday, M.D., and C. S. Brooks, M.D. 180

Discussion: William H. Wilder, M.D., W. F. Cogswell, M.D., B. Franklin Royer, M.D., A. T. McCormack, M.D.

Section I

Relation of Venereal Diseases to Vision Impairment

A. J. Chesley, M.D., *Chairman*

Illinois Social Hygiene League
National Committee for the Prevention of Blindness

Relation of Venereal Diseases to Vision Impairment

A. J. Chesley, M.D., Chairman

Mr. Lewis H. Carris (Managing Director, National Committee for the Prevention of Blindness): I want to extend greetings from the Illinois Society for the Prevention of Blindness and the National Committee for the Prevention of Blindness. We have a program that will be worth while. We want to make the discussions as informal as possible; we want to be helpful to those who come from distances. The Illinois Society is anxious to help in any way possible.

The Chairman for this morning is a distinguished gentleman from Minnesota, the health officer of that State, who has taken for many years a very great interest in the conservation of vision. I have great honor in introducing to you Dr. A. J. Chesley, of Minnesota, who will preside at this meeting.

Chairman Chesley: Dr. Kiefer, the Commissioner of Health of Michigan, wrote the National Committee that Dr. Don M. Griswold, who was slated for one of the papers this morning, unfortunately developed appendicitis and was taken to the hospital. It was thought that Dr. Griswold would be sufficiently recovered to prepare his paper, and, if so, that it would be sent for reading. Dr. Kiefer was asked whether he could come and present the discussion, but he said he was tied up with another important conference with the Governor and some people in his state. Owing to the fact that Dr. Cornell has been delayed, it occurred to me that, since Dr. Royer is quite familiar with the situation in Michigan, he possibly can make a statement which will cover some of the things Dr. Griswold would have put in his paper.

Dr. B. Franklin Royer (Medical Director, National Committee for the Prevention of Blindness): I too regret extremely that Dr. Griswold could not be here. This paper was offered to Dr. Rawlings, the Commissioner of Health of the great state of Illinois. Unfortunately, in arranging the time for this meeting, we struck exactly the same days that Dr. Rawlings had arranged a meeting of his state health officers at Springfield. Dr. Rawlings was taking advantage of

the larger public health meeting in Cincinnati to catch some outstanding health officers who would be going to and from that meeting.

At Dr. Rawlings' suggestion we asked Dr. Griswold to present this paper, and, curiously, Dr. Griswold did not intend to discuss a Michigan situation. He has recently retired from the position of Commissioner of Health of the state of Iowa to go back to his native state of Michigan. It was while in the state of Iowa that Dr. Griswold worked out what to my mind is a unique and interesting method of getting the state's function across to those who officiate at childbirth. It is that history in particular that Dr. Rawlings and I wanted Dr. Griswold to present, the Iowa method differing from the method pursued in most of the states where regulations were adopted requiring doctors and midwives to use a prophylactic solution in the eyes of the newborn.

Dr. Griswold, while Commissioner of Iowa, of course had the state laboratory directly under his control (you may remember that he advanced from Director of the Laboratory and Professor of Hygiene and Bacteriology in the University, including direction of the epidemiologic work, to the position of the Commissioner of Health). The first step by Commissioner Griswold was to direct his laboratory forces to prepare a solution of nitrate of silver in one per cent strength, seal it in small wax ampules, as is done now in nearly all the states distributing these materials. Next, his office staff went over the list of birth certificates on file in the Commissioner's office, looked up how many births had been reported by all the various doctors in the state, and then calculated the number of ampules of nitrate of silver they would require in the next six months if they continued the same active sort of obstetric practice, and sent them a supply sufficient for six months. The Commissioner then wrote a personal letter to all such physicians, calling their attention to the fact that ophthalmological and obstetrical opinion throughout the world was in favor of using a prophylactic of nitrate of silver routinely at all births and emphasizing the fact that birth infections were by no means all due to the gonococcus. He stated that while about sixty per cent of them were due to this germ, a half a dozen other germs are responsible for miscellaneous birth infections of the eyes.

I have not seen the literature, at least not all of it, or the letter going with it, hence I speak from memory. If I am not quoting Dr. Griswold quite right, both you and he will appreciate why I make this error. In that literature, after thanking the doctor for

reporting the births, etc., he called attention, I think, to the fact that the pneumococcus, which is almost universally present in the secretions from the lungs and often found in the mouth, may readily be transferred by the hands of the expectant mother to the vaginal tissues and may multiply and grow there in the days preceding birth. These germs, it is pointed out, may invade the eye as the baby's head is passing through the birth canal. He no doubt called attention to the fact that the micrococcus catarrhalis, which causes a very serious eye infection at times in the newborn, may by the same route invade the eye of the newborn. He perhaps called attention to the fact that the staphylococcus, the organism which causes ordinary boils, may occur about the birth tissues of any mother without in any way affecting her standing in society, and that those inflammations may cause serious irritation of the eye. He certainly called attention to the fact that the streptococcus, the organism that when present about the birth tissues of the mother is so apt to cause septicemia subsequently, may gain access to and cause very profound inflammation of the eye tissues and blindness.

Dr. Griswold tried to reach, interest, and assist the general practitioner of medicine, who does most of the obstetric practice in the state of Iowa, and to make him see the wisdom of routinely using the prophylactic which his state then stood ready to place in the hands of every one officiating at childbirth. In his letter, sent at the time the first ampules were sent, the Commissioner said: "If you will be good enough to advise this office when your supply is likely to be exhausted, giving us a week of time to make shipment, we will be glad to keep you supplied so that you may at all times have in your obstetric outfit these convenient prophylactic measures."

The response that Dr. Griswold had from that particular type of approach to the medical profession, a large number of whom had not previously been urged to use a prophylactic, was so encouraging that when he wrote us about it we asked the privilege of quoting the correspondence in our *News Letter*. I believe a forthcoming number of the *News Letter* will quote something from this correspondence.

Dr. Rawlings, of the state of Illinois, a neighbor of Dr. Griswold in this work, asked particularly that Dr. Griswold come here today and present this experience so that you might know just how well he had worked out the plan.

It is probable that by this sort of procedure Dr. Griswold got a higher percentage of co-operation from those who officiate at childbirth in Iowa than we are getting in some of the states where it is a mandatory requirement. Nothing in what Dr. Griswold offered

the physicians prevented their using a prophylactic which they might elect to use, but the very fact that he handed them this dependable prophylactic, which the consensus of medical opinion would indicate is the best offered for use, and the further fact that he offered it to them in this very convenient little wax ampule package, convenient for dropping in the obstetrical bag, won the doctor every time. I regret that Dr. Griswold is not here to tell you all about it.

In this state of Illinois I can give no practical suggestions. I understand that in Illinois those who are not of the regular school of medicine have been strong at times at Springfield, so there may not be in this state the opportunities to use pressure even upon midwives and upon others not regularly trained in medicine who may at times officiate at childbirth, as in some of the other states. In Illinois we understand there is no required line of procedure for those doing obstetrical practice. I know, however, that provision is made to supply the wax ampule through funds in the hands of the State Department of Health, and those who wish may use silver nitrate solution.

You are going to have a discussion this morning by the Assistant Commissioner of Health of the city, and I promised him in conversation yesterday that I might want to make a few remarks at the conclusion of his address. In fact, he suggested a certain line of questioning that I might start after he takes part in the discussion.

The man who we hoped might have made some illuminating studies of a special local situation here in the city of Chicago is unfortunately in Europe. There are some things in the Chicago statistics that I am sure the Health Department in Chicago are going to analyze further, and at a later time I hope their studies will be so widely broadcast that we may have all of the advantage of this further study.

CHAIRMAN CHESLEY: Dr. Royer very modestly did not refer to the report, a reprint of which you have, entitled, "The Prevention of Blindness in Newborn Babies." Dr. Royer collected the information from the whole country and stated it succinctly in this report, which is a very useful guide, particularly for the state and municipal health officers.

In the state of Iowa, as well as Minnesota, the midwife is not such an important factor. In Minnesota we found, on a survey of midwives three years ago, that no new ones were entering the work and that the age of those engaged is so high that it is only a question of a few years when the midwife problem will take care of itself. The midwives are under the Minnesota State Board of Medical Exami-

ners. The requirements for license of midwives are rather simple and the control over midwives is not very good.

Since the passage of our basic science act it is thought that the supervision over midwives may be extended, that more will be known about what they are doing, and the Minnesota authorities will be in position to check irregularities and to prosecute women who are not properly trained and who are attending births contrary to law.

We find no trouble, however, about the treatment of the eyes. The other day, in discussing this matter with our Chippewa Indian nurses, I found that since the nursing service was instituted among the Chippewas the women always report if a baby has sore eyes, and they get the nurse or the doctor to come and care for them. We have had a number of cases of blindness due to ophthalmia neonatorum among the Indian babies, but I think it is a thing of the past, due chiefly if not entirely to the institution of the nursing service among the Chippewa Indians.

DR. ROYER: I suggest, with the consent of the audience, that we proceed with Dr. Green's paper, after the discussion of this present subject is closed, since Dr. Cornell has not arrived. Perhaps he will be here by that time.

Minnesota was the first state in the United States to place on birth certificates a provision that the doctor report that a prophylactic was used at the time or immediately after birth, and if not, why not. I think Minnesota and Virginia lead the way in that procedure. Am I not right?

CHAIRMAN CHESLEY: I think so. Dr. Bracken was responsible for that, and Dr. Frank Todd, who died during the war. Dr. Todd was a member of the Committee of the American Medical Association which started all this work, and was very active in Minnesota in making progress toward the prevention of blindness.

If Dr. Green will be kind enough to take Dr. Cornell's place out of turn, we will hear from him now.

Syphilitic Eye Tragedies and Their Prevention

JOHN GREEN, M.D.
St. Louis, Missouri

There is no organ of the body that may not be ravaged by the virus of syphilis. When the delicate tissues of the eye are attacked, it is imperative that all the aids of modern syphilotherapy be utilized. What profits it if, in the end, the eye recovers its natural appearance but is blind? To save sight is the goal; to reach that goal may require the effective teamwork of the serologist, the syphilologist, the ophthalmologist, and the social worker.

The unfortunate baby who arrives in the world carrying the burden of syphilis has indeed a heavy load—often too heavy, and the little life is soon crushed out. Surviving, he may eke out a miserable existence for a few years and then succumb. With greater vitality he may reach his 'teens, only to be attacked by interstitial keratitis, and live the rest of his days under the handicap of impaired vision.

The incidence of ocular involvement in hereditary syphilis has been variously estimated. Among 127 cases Rabl found ocular involvement in 39 per cent. Fournier found 48 per cent of 212 syphilitic children with eye affections. Interstitial keratitis has generally been regarded as the most frequent ocular complication of inherited syphilis. Statistics of different authors vary widely, but it is probable that of all syphilitic children who survive long enough to develop late hereditary syphilis, nearly 50 per cent have interstitial keratitis. It is an interesting fact that treatment instituted to cure an established keratitis in one eye will not prevent the occurrence of the disease in the other. On the other hand, intensive and prolonged treatment of a syphilitic infant will usually prevent the development of keratitis in either eye. The disease does not usually lead to blindness, but few eyes that have passed through a typical attack ever regain full visual acuity. Thus prophylactic treatment is of the utmost importance.

Dust-like opacities of the vitreous in children mean hereditary syphilis. This may be suspected when the vision fluctuates within fairly wide limits. Lesions of the eyeground are of various kinds, and tend to be located primarily in the periphery. Though vision

may be impaired, the infant is rarely so blind that he cannot grasp at toys and in other ways comport himself as a normal child. Only when it becomes the universal practice to include an ophthalmoscopic examination as part of the routine of the examination of every syphilitic child will these changes be brought to light.

About ten years ago I made a systematic examination of the eyes of 100 syphilitic children. Of these children, 74 presented definite pathologic conditions in one or more of the ocular tissues or some derangement of ocular functions; 52 presented undoubted pathologic eyeground lesions. The lesions were situated in the retina and choroid and were of various types. Predominant was the "black peppering" of the eyeground, which I believe is characteristic. A few cases of optic neuritis and optic atrophy were observed.

If 74 of 100 syphilitic children show ocular pathology in one or more of the tissues of the eye, and if 52 present eyeground lesions, then it certainly behooves pediatricians to require a complete ocular examination in every such patient. Without such an examination the clinical picture may be incomplete and, what is more important, the lack of knowledge of what exists in the eyeground may militate against intelligent treatment. If there exists a peripheral lesion, it is of the utmost importance to check its progress by intensive treatment before it impairs central vision by reaching the macular region.

Hereditary syphilis will probably never be entirely prevented, but it is reasonable to hope that its incidence may be greatly diminished. In these days of the arsenical and of bismuth, a man who has acquired syphilis is quickly freed of all outward signs of the disease and, rejoicing in his apparent "cure," soon marries. Possibly the physician has failed to impress his patient with the chronicity of the affection and the long course of treatment required for complete recovery. Often husband and wife are unaware of the existence of the disease until it appears in their offspring.

It is clear that in such a case the expectant mother will not present herself for treatment during pregnancy, and hence her unborn child will not receive the benefit of anti-syphilitic treatment administered during this period. On the other hand, if the disease in the mother is recognized (and it is much more likely to be if she has had an initial lesion, with well-marked secondary skin manifestations), intensive anti-syphilitic treatment may entirely prevent the disease in her child. Unfortunately, cases of this character are decidedly in the minority.

Our clinics for the treatment of syphilis have been doing a work of education in insisting and reinsisting on prolonged treatment as the *sine qua non* of definitive cure. The oral instructions of the doctor are supplemented by written directions; then comes the follow-up work of the social service department, often leading to the discovery of other cases in the family. Such efforts will, in the long run, do much to lessen the number of insufficiently treated adults and hence the number of syphilitic babies.

But there will always remain the careless, the ignorant, and the ineducable, who will be wholly content with the disappearance of the outward signs of the disease, and who will not pursue the long course of treatment necessary for its complete eradication.

The ocular effects of acquired syphilis are, in the secondary stage, cases of iritis, rather frequent in dispensary and rather rare in private practice. It is probable that the incidence of syphilitic iritis is diminishing, which is due, I believe, to the more energetic attack of modern remedies on the disease. A syphilitic iritis is only rarely a tragedy; usually it responds readily to treatment, and the attack is survived with vision unimpaired. Keratitis, usually unilateral in acquired syphilis, offers an effective field for therapy, and the visual impairment is slight. Choroiditis and retinitis may be of syphilitic origin and often lead to grave visual impairment, despite the most energetic treatment. In the secondary stage a brick-red disc with veiled margins indicates an indolent optic neuritis which readily subsides under appropriate remedies.

The real tragedies of acquired syphilis are the optic atrophies that occur years after the initial lesion. The histories presented by these victims are monotonously alike. An insignificant, quickly healing initial lesion, rapidly vanishing secondaries, and then a long, long period of immunity, so that the incident becomes misty or is wholly forgotten—and then vision slowly fails, first in one eye, then in the other. After the usual futile effort to get glasses from the optician, the oculist is consulted and finds the chalky white discs and contracted visual fields—symptoms of optic atrophy. The disease is very prevalent among negroes.

Here is tragedy, indeed, for most of the victims are in the prime of life, often robust, capable, save for their eyes, of doing a full day's work. The appeal to the oculist is too often in vain. Baffling and discouraging alike to doctor and patient, the course is often down hill to total blindness. Mercurials, potassium iodide, and strychnin have been our main reliance—alas! too often ineffective. More encouraging is the use of tryparsamide, which in a fair per-

centage of cases has prevented further deterioration of vision. Concerning therapy, permit me to quote from a personal communication from Dr. Lee D. Cady, of St. Louis, who has had a wide experience in treating neurosyphilis: "I believe that in a large percentage of syphilitics where ocular disturbances have progressed, fewer of them progressed while on anti-syphilitic therapy of almost any sort. I have gained the impression that tryparsamide patients do even better than those getting mercury or one of the salvarsan derivatives. It is difficult to sift out the real truth from the literature on tryparsamide." Evidence is accumulating that intracisterna injections of bichloride of mercury may, at least temporarily, improve vision.

When all is said and done, the prevention of eye tragedies in syphilis lies in the prevention of the disease or in its early, adequate, sufficiently prolonged treatment, which implies expert management by the physician and faithful co-operation of the patient.

CHAIRMAN CHESLEY: I will ask Dr. Benedict to present his paper at this time. The topic is, "Early Treatment in Relation to Eye Tragedies."

Early Treatment in Relation to Eye Tragedies

William L. Benedict, M.D.
Section on Ophthalmology, Mayo Clinic, Rochester, Minnesota

In this symposium on the relation of venereal diseases to eye tragedies the consideration of treatment is logically placed at the last. When prophylactic measures have been ineffective or not employed, a degree of blindness may be the heritage of an innocent child unless medical treatment can prevent this tragedy.

Blindness in children caused by venereal diseases stands today a stinging rebuke to the unbridled lustfulness of society, to the unwillingness of the body politic to authorize legislative control of diseased men and women in marriage contracts, and to the disregard of the life-long discomfort and humiliation of the innocent and afflicted children, the care of whom falls on the state. The burden of taxation to support the necessary institutions is so light as to be hardly felt by the average citizen, and hence the problem does not arouse his active consideration.

Efforts to control the propagation of venereal diseases have occupied the time and attention of hundreds of medical practitioners. They have been given support in money, equipment, and nursing aid, and in educational propaganda by lay organizations and such governmental agencies as are permitted by law to do so; but the battle is endless and recruits must be drawn to service continually. Conditions in the same community are widely divergent from time to time, and in communities not widely separated social customs and political activities are so varied that problems of health and of the control of disease call for different solutions. It has long been observed by epidemiologists that health regulations are likely to break down in communities where contagious diseases are rare, because the average person comes to believe that the danger is not so grave as he has been told. Finding hygienic restrictions irksome, he rebels against regulations that have been made to protect him and society, and, through careless disregard of law and good judgment, brings calamity on himself and his neighbors through the introduction of epidemics of controllable

diseases. Everywhere an army of workers must be on the alert with every facility at its command to check devastating epidemics and the spread of contagious disease. Fortunately, there are now great medical and lay organizations fully manned by a trained personnel and adequately supplied with money and equipment ready to move into any part of the country and to give emergency aid. But this army must have scouts to detect trouble in its incipiency, and it must move in without waiting to be called. It is largely a voluntary movement, a humanitarian agency exercising vigilance.

The part of the physician in this movement is vital. His duties include scouting, policing, organizing, moving, fighting, directing, and sometimes arranging the service of supplies. Just so long as medical education and training are kept on scientific foundations will the physician continue to act in these capacities. Lay organizations have contributed most generously, in money and moral support, to the founding of scientific schools for the training of medical students. They have built great hospitals and medical centers and encouraged the public to utilize them. The medical profession has been wonderfully supported in its efforts to make disease less common and less disastrous, and its efforts have been well repaid. Let there be no lapse into disregard of necessary health regulations. The transfer of lay support from scientific medicine to so-called healing cults, now recognized and licensed by many legislatures, would plunge us into an age of darkness and despair, of suffering and indignities, unthinkable and unmentionable.

The control of venereal diseases in this country is a joint undertaking of government agencies and lay organizations under the direction of medical scientists. The control of the spread of social diseases and the mitigation of their devastating effects are complicated by inability to control persons who have the disease. This is a social problem which the physician cannot solve. However, that the person who has contracted a venereal disease can be effectively restrained is shown by this note regarding one of the European countries, which I quote from a London letter printed in the *Journal* of the American Medical Association:

"When a patient applies to a physician for treatment, the latter is bound to notify the fact, but notification is by number and not by name, unless the patient fails to continue under treatment until cured, when the physician is required to report his name and address to the commissioner, who is a physician. The patient is then informed of the penalties which he incurs unless he resumes

treatment. In practically all cases in which a patient can be reached, he resumes treatment. It is seldom necessary to resort to prosecution. . . . The advertisement of remedies for venereal disease is forbidden; treatment must be by physicians, only. A person suffering from such a disease must, within three days of becoming aware of his condition, consult a physician, to whom he must furnish his correct name, occupation, and address, and to whom he must submit himself for treatment. Disobedience is punishable by a fine not exceeding $500 or imprisonment for three months. There is a provision for secrecy. A physician who, otherwise than when required by the act, discloses the condition of a patient is liable to a penalty not exceeding $500 and shall be deemed guilty of professional infamous conduct. Marriage by a patient suffering from venereal disease in an infectious stage is an indictable offense, punishable by a penalty of $2,500 or five years at hard labor or both. If a physician has reason to think that marriage is intended he may inform the other party, the parent, the guardian, or the commissioner. Patients (or, in the case of children, their parents) are to be warned of the dangers of contagion. It is an offense to work in a shop, factory, hotel, or restaurant when suffering from venereal disease. To infect one knowingly is punishable with a fine of $500 or twelve months' imprisonment or both."

By such drastic legal action no real injustice can be done. While there will be evasion on the part of the patient and probably some lack of enforcement on the part of the physician, yet the number of persons infected by a venereal disease will inevitably become much smaller. There are obvious difficulties in the way of adapting such legislation to this country, but certainly the incidence of disease could be reduced by the application of a modified enactment.

I have dwelt at some length on the question of the control of venereal diseases and the relation of the physician to its social and legal aspects, because the treatment of ocular diseases of venereal origin falls entirely upon the physician. If I am correctly informed, more than a half of the births in some of our large cities are attended by non-medical accoucheurs. In some of the poorer sections of the city a great many of the births are attended by midwives or non-medical practitioners. This state of affairs is probably unavoidable and not to be condemned at sight. However, it influences the infants' welfare, which is an intimate concern of the state. For statistical purposes, birth registrations are required in most states, and the reporting of contagious venereal diseases in the mothers is required in some. Acute blennorrhea, if due to gonorrhea, is reportable to the public health officer and the report usually must be made by a physician, for the midwife or non-medical attendant is not sufficiently trained to make the diagnosis.

Ophthalmia neonatorum may therefore be discovered only after it has become well established and serious sequelæ are practically unavoidable. Infection in the eyes of the mother, the nurse, or the attendant is not infrequent. In the adult, gonorrheal ophthalmia is most difficult to control and is most likely to be followed by blindness. Fortunately, ocular contagion in the adult is rare and it is usually unilateral. If patients are not under medical care at the time of infection, the opportunity for deriving good effects from early treatment passes and they are among the unfortunate who populate our institutions for the blind.

The early treatment of venereal ophthalmia begins with prophylactic measures. Careful irrigation of the eyes with a cleansing solution, followed by the instillation of a solution of silver nitrate, constitutes the first treatment of the child so affected, as well as the preventive measure for those who are not. Repetition of treatment is indicated in the case of all children born of infected mothers. If used with the ordinary precaution exercised by physicians in administering all drugs, one or even two per cent solution of silver nitrate can be instilled into the eyes of babies daily for several days without harm. A false sense of security may be entertained by the uninformed through confidence that a single instillation of silver nitrate will prevent ophthalmia neonatorum, and there is no doubt that often this is true. Since the introduction of the Credé method the incidence of ophthalmia neonatorum has become negligible in some districts. There has been, however, an unwarranted tendency to reduce the strength of the solution, to modify the method of administration, to substitute another drug, or to omit altogether any special attention to the eyes at birth. Even when supplied free of charge by the State Board of Health, the wax ampules of silver nitrate solution frequently are not used, or are used carelessly or inefficiently. Educational propaganda must be broadcast continually. Eternal vigilance is the watchword. A more universal regard of the law requiring the application of the Credé method of prophylaxis by non-medical accoucheurs must be urged. The advantages of the use of the drug must be emphasized above the disadvantages. The repetition of its use daily for several days, whether by medical or non-medical attendants, in cases of threatened or suspected contagion, is justified. It is much better to use silver nitrate in ten cases in which it is not necessary than to omit it in a single case in which the need is not suspected.

It may be inferred from these remarks that the early treatment of venereal ophthalmia consists in the rather frequent instillation or

application of a solution of silver nitrate. Undoubtedly it is the accepted method of treatment by which all other methods must stand for comparison. The disease is an inflammation of the mucous membranes of the eye; the gonococci are found to be multiplying in the superficial layers of tissue cells which are nourished by an abundant blood supply, and in which heat and other conditions favorable to the propagation of the germ are present. The logical weapon is an agent that can penetrate the tissue cells and inhibit the growth of the organism. Silver nitrate is the best known agent for this purpose. In the hands of a person skilled in treatment a two per cent solution of silver nitrate can be made to act as a mild astringent or as a severe cautery. The depth of its effect on the tissues can be finely regulated and its action is not unbearable to the patient. While I have tried many substitutes for this drug in acute diseases of the conjunctiva, I have seldom seen any effects that I considered superior to those obtained by silver nitrate.

It is important to bear in mind in treating venereal ophthalmia that any break in the epithelium affords an avenue of entrance behind the first barriers of defense. The corneal epithelium is particularly resistant to the invasion of micro-organisms, and, when it is broken, the way is open for the corneal ulcer that is the immediate cause of blindness. The break in the epithelium may be due to trauma. Therefore it is unwise to use cotton-wound wooden applicators for any purpose about an eye so affected. Ulcer may follow inspissation of pus, desiccation from lack of adequate lid coverage, edema of the conjunctiva, pressure induced by swelling of the lids, or malnutrition. Frequent irrigation of the eye with warm neutral or alkaline lotion, instillation of neutral oils and application of cold moist compresses are indicated as early measures to prevent ulceration of the cornea. Surgical intervention to reduce the pressure of the lid is seldom indicated and practically never in the early stages. The success of early treatment depends largely on the skill with which it is carried out. In institutions in which trained nurses care for the infants ophthalmia neonatorum is often arrested or at least its consequences are less disastrous. This justifies the special efforts to provide suitable hospital care for all children with ophthalmia and better conditions under which deliveries are to be made. Ophthalmia neonatorum is now very rare in well-conducted obstetrical wards.

In recent years a method of combating the disease by means of systemic reactions has been used to a small extent. These reactions

are stimulated by the injection of foreign protein substances, such as cow's milk, blood serum, or specific antitoxins. I am not in a position to evaluate this procedure on a therapeutic basis, but encouraging reports have been published from trustworthy sources and I have no doubt that with the advance of our knowledge of protein therapy, will come also better reports of its use in the treatment of ophthalmia. Like other means at the hand of the physician, it must be employed early in the course of the disease. Probably its chief function, as I see it now, is to alleviate suffering by reducing an inflammatory reaction. Pain is materially reduced and the patient made much more comfortable, hence more amenable to other forms of treatment if a satisfactory reaction to protein therapy is obtained.

In the later stages of venereal ophthalmia complications arise that require special consideration on the part of the physician. General rules of treatment must be supplemented by whatever agencies the ingenuity of the medical profession can produce or apply. Antiseptics, immunity, hydrotherapy, and thermotherapy have been employed with effective results, but the battle is not won. Newer therapeutic agencies must be sought to supplement those which we now have; new hands must be trained to the best use of known remedies. The need of detection and early treatment of acute ophthalmia must be impressed on every one whose interest can be aroused. The differentiation of venereal ophthalmia and non-venereal suppurative disease of the eye must be left to the physician, who can avail himself of bacteriologic investigation. Clinical differentiation without microscopic aid is not to be encouraged, and neglect of this important means of diagnosis is little short of criminal.

This discussion of the early treatment in relation to eye tragedies is concerned mostly with ophthalmia neonatorum, because of the frequency with which it causes blindness. Injuries to eyes at birth through application of forceps or other accidents require early repair if the best results are to be obtained. Prenatal care provided by obstetricians, pediatricians, and child welfare organizations should be encouraged and supported liberally.

Syphilis as a cause of ocular disease has been much discussed. In this disease the ocular complications are not so acute; the need of special attention to the eyes is not so evident. In this time of medical specialization the treatment of syphilitic disease of the eye is shared by the syphilologist to a greater degree than it was a few years ago. Syphilis is a systemic disease with a wide variety

of symptoms and signs. Anti-syphilitic treatment has become highly specialized and should be carried out by experts who have become masters. Here, too, early treatment is important, but continuous treatment under competent supervision is equally important so that late manifestations of the disease may not shut an individual from the light of day.

CHAIRMAN CHESLEY: Dr. Cornell has come in, in the meantime. We shall be pleased to hear him present his paper now.

Bacterial Invasion of the Birth Canal: Its Menace to the Newborn

EDWARD L. CORNELL, M.D.
Assistant Professor of Obstetrics, Northwestern University, Chicago, Illinois

When the physician speaks of infection in the vagina the average person immediately thinks it must be a venereal disease. This does not necessarily follow. While it is true that most vaginal infections are venereal in origin, I must emphasize the fact that a great many are not. In fact, careful investigation will show that the gonococcus, pneumococcus, staphylococcus and streptococcus are among the more common bacteria found. Aside from these, we have the saprophytic bacteria and the protozoa, especially the trichomonas. Thrush is often seen.

How these various organisms gain access to the vagina is more or less definitely known. Of course, the most frequent and usual way is by marital relations, but this does not account for the cases seen in virgin women. There is no question but that women who are careless in their personal toilet contaminate the vagina by handling the vaginal lips with unwashed hands. Fecal matter is thus frequently introduced. Many vaginal infections are acquired by bathing in dirty water, especially at crowded bathing beaches. The pressure of the water causes it to invade the vaginal canal, where the bacteria are deposited. Exchanging bathing suits and wearing of improperly washed bathing suits may be the source of the infection. Another, not infrequent method of infection is douching. This practice is quite common, being fostered by the advertisements in magazines of douche outfits. Douching is a pernicious habit, fraught with much danger aside from the infection it may cause. Most women have no idea of the correct way to use the douche, let alone the proper method of preparing the outfit. On inquiry I find that the outfits are seldom sterilized by boiling before use. The douche solution is rarely, if ever, boiled. Not infrequently douche outfits are loaned by one woman to another for the same purpose. Is it any wonder that the vaginal tract becomes infected?

Another possible source of infection is the use of surgically unclean pads and cloths at the menstrual period. The public toilet has a certain inherent danger. Dust of the street may be carried upward

and lodge on the vagina. Bacteria then gain access and may or may not produce an inflammation. Gonorrhea and syphilis are the *bête noir* of the newborn. While gonorrhea does not kill, it is liable to produce so much damage to the eyes that life becomes more or less a living death. Gonorrhea is a disease which is very difficult to cure; the bacteria lying dormant for long periods, only to be awakened by some unusual activity in the genital tract. Carelessness on the part of the one infected may be responsible for much damage not only to the individual's own eyes but to others.

Small baby girls may get a gonorrheal vaginitis which is extremely difficult to cure. It gradually subsides and, in the course of time, is forgotten. When the young lady marries and has a baby it is frequently rediscovered. Usually, however, the husband is accused of infecting his wife. This leads to much unhappiness for many people and a health menace for the baby. When a woman is pregnant, the vaginal secretions are increased in amount. The parts are moist all the time, thus becoming fertile soil for the growth of bacteria. It is at this time that personal cleanliness is essential. It is also imperative that examinations by physicians should be conducted under strict asepsis.

The vaginal canal at all times contains bacteria which are not pathogenic to the individual, due to the immunity which she has developed. This holds as long as the structures are not injured in any manner. If the parts are injured, the bacteria may produce an inflammation, especially in pregnancy and labor. In labor there is always a certain amount of bruising and the growth of bacteria is favored by the congestion produced. If the bag of waters breaks several days before the onset of labor and the vaginal canal is infected, the baby is very likely to die inside the uterus. The cause of death is infection, in most cases. The virulent bacteria invade the uterine cavity and, in a few hours, infect the baby. These children may be born alive with temperatures as high as 103° and 104° and they usually die in a few days.

What is the menace to a baby? You are all familiar with effects of gonorrhea on the eyes of the newborn. You have seen or heard of the lesions produced by syphilis, but what do you know about lesions produced by other bacteria which invade the vaginal tract? I shall not dwell on the effects of gonorrhea or syphilis except to say that fortunately in the larger communities they are seen less frequently, due to the effective work of various social agencies and the tendency on the part of women to have babies in hospitals. In spite of all this the effects are occasionally seen.

I have spoken of the effect on the baby of premature rupture of the bag of waters. This accident happens more frequently than is suspected. Therefore, it is essential that women should be careful in personal cleanliness and marital relations during pregnancy.

Skin infections of various types are seen. They vary from small pustules to boils and the type of lesion known as pemphigus neonatorum. We have found that the latter disease is sometimes very serious, many deaths being ascribed to it. We also know that it is caused by the staphylococcus. Some authors claim that it is due to infection of the skin after birth only, but I am inclined to believe that it can be due to vaginal infection with that particular strain of staphylococcus. Baby's skin is very tender and liable to injury during birth. If the baby is not badly infected, we may see disorders of digestion or attacks of pneumonia which do not necessarily cause death, but may hold the baby back until his resistance is so lowered that he is classed as a delicate child. I have seen severe cases of ophthalmia neonatorum result from the pneumococcus. However, I have never seen a case of blindness follow. Not all these cases are due to vaginal infection, but many are.

What to do to prevent these disturbances and vaginal infections from arising is a difficult problem. We must educate the public. We have several means of doing that—propaganda in the magazines, direct contacts through the social agencies, through the public health service, and other official and volunteer agencies. It is my idea that we should begin with the children. If you wish to educate thoroughly, you must start with the young. If we will begin in the high schools to teach personal hygiene, we will find that many of the mothers will be taught also, and personal hygiene will not only be taught to the children in the schools, but will be taught to the mothers in the homes. The school physicians and nurses are well equipped to teach this subject.

The establishment of prenatal clinics, especially in smaller communities, is another source of education. In the larger centers we have plenty of prenatal clinics, while in the smaller centers we have very few. The physician must be educated to establish these clinics.

It is very difficult to educate ignorant people, especially immigrants, because they are still using midwives, and their deliveries occur in the home. I believe it is possible for us to reach these midwives and educate them along the same lines. We have been rather successful on the South Side of Chicago in getting midwives to attend lectures given by the staff of the Chicago Lying-in Hos-

pital. It is surprising how many of these women now ask to attend lectures given by the staff of the Chicago Lying-in Hospital. It is surprising how many of these women now send in complicated cases early. If we can educate a small group of midwives by propaganda, it is only a step farther to do the same thing in the question of personal hygiene. We must prevent the vaginal infections if we expect to prevent infection in the newborn.

Discussion

CHAIRMAN CHESLEY: Dr. Hugh O. Jones, who needs no introduction to you, will begin the discussion.

DR. HUGH O. JONES (Assistant Commissioner of Health, Chicago, Illinois): From the papers that we have heard I feel satisfied that our visit here this morning will well repay us. The Health Department is primarily interested in the phase of the work discussed from the standpoint of having all cases reported. It is essential in all epidemiologic work that we know where the cases are, and the more complete the reports, the better will be the results.

Under the state law in Illinois all cases of sore eyes in infants under two weeks of age must be reported by telephone within six hours from the time at which they are seen, followed by a written report. The report must be made by the physician in charge, the midwife, the parent, or any one who has knowledge of a case or suspects the condition. Under the law we do have a provision that makes it mandatory for the reporting of cases. Unfortunately, the law in the state does not make it mandatory to use silver nitrate. The law permits the physician to advise its use, and the midwife in charge of the case has to receive consent of the parents before she is permitted to use it. Unfortunately, I think this obviates the effect of the law to some extent.

It might be well for the National Committee to use its influence at the proper time to see that the law is modified so that it will be effective.

I think it might be interesting to the group here to know how many cases of ophthalmia neonatorum are being reported in Chicago under the law of reporting for the last ten-year period. Of course, you must appreciate that all these cases of ophthalmia neonatorum are not necessarily gonorrheal infections. I have no accurate data here, but I am of the impression that not more than twenty-five per cent of the cases that are reported are gonorrheal infections.

Dr. Royer wanted to know yesterday afternoon if we had definite knowledge as to the exact number of cases. I was sorry that we were unable to get that from our reports, but acting on his suggestion, I think in the future we can arrange our plans so that we will have definite information on this particular subject. Dr. Royer also brought up the question as to whether we knew how many of these

cases occur among the colored people and among the white. Unfortunately, our reports at the present time do not cover this phase. This comparable data will be added to our regular reports.

In 1917, we had 181 cases reported; in 1918, 124; in 1919, 161; 1920, 177; 1921, 306; 1922, 343; 1923, 378; 1924, 448; 1925, 519; 1926, 457. The Department has been actively enforcing the reporting of ophthalmia neonatorum. In 1921 charges were brought against one physician and as a result of the evidence introduced he was fined on three cases, $100 fine on each case. In 1922, the courts assessed a fine against one midwife, of $25. In 1923, there was a physician fined $25, another physician fined $5, and one midwife fined $25. In 1924, one midwife was fined $100, five midwives $25, and one midwife $10. In 1925, one physician was fined $50, one midwife $10, one midwife $200. In 1926, two physicians were fined $100 and two midwives $100. There is no question but that these fines and convictions do have a salutary effect upon enforcement of reporting cases.

It is interesting to let you know what results so far have been obtained by the Department, particularly through the efforts of the Illinois Society for the Prevention of Blindness. In 1920, only two children became totally blind in one eye; in 1921, four children became totally blind in one eye; two children blind in both eyes; in 1922, two children were totally blind in one eye, and one child partially blind in both eyes; in 1923, one child became totally blind in one eye; in 1924, one child became totally blind in one eye; in 1925, two children became blind in both eyes; in 1926, one child became blind in one eye and one child blind in both eyes.

The only way we are ever going to avoid unfortunate results of this kind is by following the suggestions of the previous speakers. We must rouse public opinion. The public must be educated on the importance of proper care of babies' eyes at time of birth.

I am heartily in favor of one of the papers of the previous speakers who mentioned that in his opinion the children in school are the fertile ground in which to sow the seed of education in health matters. Our old folks have formed their habits and have become almost too set to be taught new methods of procedure.

With the system the Department has now in our infant welfare work Chicago is divided into 166 districts; at least one nurse is assigned to each district. The nurse calls on all the babies in the district as soon as the birth report comes in to the Department. In that way direct and almost immediate contact is made with every child that is born. When she visits the home the nurse notices the condition of the child, and should there be any evidence of any inflammation of the eyes or other illness, the case is reported to the Department and the record made of whether or not there is a physician on the case. In the event there is no physician on the case, a health officer is assigned. Should the health officer make a diagnosis of ophthalmia neonatorum, smears are taken, and if the diagnosis is confirmed by the laboratory, the case is turned over to the Illinois Society for follow up.

The Department cannot speak too highly of the splendid co-operation which the Illinois Society for the Prevention of Blindness has always rendered.

I want at this time to mention the splendid assistance that was received from the deceased secretary, Miss Campbell. Her untiring zeal and interest was a stimulus to us all, and I know that the memory of her activity will be an incentive to us who are left behind to try and obtain the results that she worked so hard for, to overcome blindness in the infant and to conserve the sight of our children.

MR. GEORGE F. MEYER (Supervisor of Sight-Saving and Braille Classes, Minneapolis, Minn.): Are questions in order, Mr. Chairman?

CHAIRMAN CHESLEY: Questions are decidedly in order.

MR. MEYER: I should like to ask, from the standpoint of communities not quite so well organized from the prevention point of view, whether the number of cases reported is a true index or any index at all of the efficiency of the preventive work, or if that is not, what is? In other words, how can a community in a sense survey itself provided it has the legislation already on the books?

DR. JONES: As I understand it, the question is, are the number of cases reported an index of the actual infections incurred?

CHAIRMAN CHESLEY: Also, of course, an index of the efficiency of the enforcement.

DR. JONES: Since 1925, the Department has been visiting every baby that is born; the reports might be considered quite complete because our representatives are seeing every baby that is born during the first two weeks. Of course, the midwives, physicians and others, knowing that we are doing this, are stimulated. I do think where we have contact with every case of birth, the number of cases reported is an index of the prevalence of the conditions in the community. The ultimate result, though, as to blindness or conditions of the eyes after the inflammatory condition has subsided would be more of an index as to the efficiency of the treatment which has been conducted in the particular case.

CHAIRMAN CHESLEY: I think that answers the question for Chicago very thoroughly. I regretted that in your discussion you did not go into more detail about the Chicago Health Department work in connection with child hygiene, the literature which is so promptly and efficiently sent out, and the immediate contacts made. I think it is almost unique in the whole United States. Of course, it is not possible to do this in rural districts in state health work, but in cities it certainly can be done if the facilities are provided.

The system here in Chicago seems to be marvelous to the health authorities of this country who have investigated it. Will you say something more about that, Dr. Jones?

DR. JONES: I want to thank you for the compliment to the Department efficiency. The Department of Health is proud of the

results that have been obtained in its infant welfare work. It is not so very long ago that we hesitated to say anything about our infant mortality rate, for we were not proud of it. For years, of the eleven larger cities in the United States, Chicago held seventh place from the top. Last year, Chicago made first place of the larger cities in the United States on our infant mortality rate, with a rate of 66.6 per thousand births reported and occurring during the current year. I wish to emphasize this statement "occurring during the current year." Other cities are basing their rate upon gross birth reports. If we did that, our rate would be 58 per thousand.

How was this work done? First, the present Commissioner, Dr. Bundesen, in 1922, realizing the importance of infant welfare work, went before the City Council and obtained an additional appropriation of $100,000 with which to operate infant welfare stations. The benefit of infant welfare stations has long passed the experimental stage. It is a fact that the Infant Welfare Society of Chicago has thoroughly demonstrated by splendid work what can be accomplished by work through stations. So we, with the additional $100,000, established twenty-three new stations.

There is much that can be done to help keep well babies well, by having clinical facilities and by educating the mothers in the proper and immediate care of their babies. But it is impossible to reach the entire community, and results are obtainable in direct proportion to the number with which you can get into immediate contact.

With this in mind, the Commissioner decided that it was desirable to carry on a more thorough educational campaign, and prepared the booklet, "Our Babies." The book is written in a popular style, the language is kept within what the twelve-year-old mentality could absorb, and it is profusely illustrated. In this connection Dr. Bundesen believes that you can visualize education a great deal better than you can by writing it. We have distributed approximately 300,000 copies of this booklet, "Our Babies." Other cities have complimented us by publishing the booklet and distributing it in their towns. Cleveland, Minneapolis, and other towns have done so. The Metropolitan Life Insurance Company has taken the booklet and published a quarter million copies of it for distribution among its clientele.

The booklet, "Our Babies," is given to every mother as soon as the report of birth comes to the department. In addition, if the birth occurs in a hospital (and about fifty per cent of the births in Chicago now are in hospitals), through an arrangement with the hospital organization the mothers receive the booklet for study during their lying-in period. If the births are at home, the mothers receive the copy as the nurse makes the initial call delivering the notification of birth registration. Besides this booklet, we send out to mothers each month a monthly letter covering the important phases of child life during that particular month. That makes a series of twelve letters covering the first year.

From time to time additional bulletins are sent out covering timely subjects, such as care of infants in hot weather, care of colds, instruction on measles, pneumonia and other allied subjects.

Besides this literature, when the baby is three months old, the mothers receive a copy of the booklet, "Before the Baby Comes," which is a popular edition for instruction to mothers during the pregnant period.

In that way we have educated the public on subjects of infant welfare, and we feel that results speak for themselves. We have, for years, adhered to the recognized methods of procedure, and did not make the required improvement in our record, but with this concentrated effort to educate, we have reduced our rate to a point where we are proud of it. However, we realize that results will continue to remain with us only so long as we continue to carry on a constant effort in education.

MRS. C. CRESWELL (Grand Rapids, Mich.): Among some things that I want to commend is the point that Dr. Cornell made regarding educating physicians. I think private physicians take it for granted that their patients already know things that they don't know. The great good of the clinics is taking it for granted that mothers are ignorant, and the private physician does not take that into consideration with his private patient. I like that point.

CHAIRMAN CHESLEY: It seems to me that since we have discussed Chicago's phase of this problem and reference has been made to the work of the Illinois Society, this might be the time for Mr. Roloff to explain further what the society has done in relation to the program here in the city as well as elsewhere in the state.

MR. BERNARD C. ROLOFF (Illinois Social Hygiene League, Chicago): Instead of doing that, I should like to hear from Dr. Bertha Shafer of our staff for just a few moments in relation to some of the phases of the papers that have preceded us.

DR. BERTHA M. SHAFER (Illinois Social Hygiene League, Chicago): We have a clinic at the Illinois Social Hygiene League for congenital syphilitic children and we are trying there to do as much as we can in the way of preventing these later classifications. I was very much interested in Dr. Green's reference to the necessity of the routine examination of the eyes. We felt some time ago that this was rather important and we now have an ophthalmologist at the clinic during the time that we are examining these children that he may make this routine examination, because we have felt that without an individual trained particularly for that line of work, very often some of the symptoms might be overlooked in our more superficial examination. We find that we have been greatly aided by this co-worker.

CHAIRMAN CHESLEY: I understand that Dr. Evans could not be here but he was to send some one to discuss in his place.

MR. ROLOFF: Dr. Evans suggested that in his place we have some one from our staff here, and that is the reason Dr. Shafer and I came, though not the only reason, of course. If you want me to take a few minutes, I shall be glad to, although I am a poor substitute for Dr. Evans.

May I just add to what Dr. Shafer said that the Illinois Social Hygiene League in its work has been particularly interested in the syphilitic child and the prevention of the birth of syphilitic children. In that connection it has gone even further back in its efforts in prevention than Dr. Shafer just suggested with relation to the eye phase of the situation.

For example, we are making every effort in this city, as far as our own resources permit, to find mothers who are syphilitic and pregnant and get them under treatment. We have gone so far as to call a meeting of the various child-caring agencies of the city of Chicago, particularly those which house institutional children. We got them to subscribe to a program which provides for an examination of all the children in their care for syphilis and gonorrhea, and to subscribe to a plan whereby they will accept no children in their institutions without a preliminary examination for venereal infections. They discharge no children from their institutions unless such an examination has been made. Particularly, those organizations which, like orphan asylums and child-placing institutions, have the responsibility of placing children in homes, do not place any children who have these diseases, without the advice of a physician and without first putting them under treatment for a reasonable length of time. In that way, and working back through those children to their parents, we have uncovered many cases of mothers who have hitherto borne syphilitic children and who would again possibly bear syphilitic children who are put under treatment during their pregnancy at our clinic. Almost invariably, I should say in 59 per cent of the cases at least, those mothers have borne normal children after adequate anti-syphilitic treatment in the clinic.

I think there is no doubt of the fact that this in itself prevents a great many of the eye tragedies that we are talking about here today, tragedies which we find so often in the older persons who come to our clinic with the end results of syphilis.

Dr. Royer: There are several things that have occurred to me in the course of the discussion, and if I may say a word now, I felt that the question raised by Dr. Meyer was not quite adequately discussed. It brought out several things that I mentioned while I was taking Dr. Griswold's place in regard to the further analysis that Dr. Jones has in mind with reference to the cases of infected eyes in the city of Chicago. What are the end results, where are they occurring? With what nationality? The very fact that when Dr. Geier sent me the triennial report of the city of Chicago and a letter with it calling attention to the fact that in the last three years there had been apparent increase in ophthalmia neonatorum here, didn't satisfy me. It may be due to better reporting. That is a pretty safe guess, but it is not accurate information. It was with that thought in mind that I asked Dr. Jones if they would not arrange to analyze those figures so that the country might have at least established a base line from which to work. We are not yet supplied with accurate figures. Is a part of the lessening of blindness due to better treatment? Is it due to the fact that the cases are coming under ophthal-

mologists' care and in hospitals earlier and in larger numbers, and is the blindness prevented for that reason or is it the prophylactic treatment? You may know that in conservative old Philadelphia for a long time the ophthalmologists opposed the use of silver, feeling that early treatment was the thing to do. It was only recently that Philadelphia started the use of silver.

We need a careful evaluation, and I don't mean by that the last report of the doctor at the time he quits treatment. Very few ophthalmologists would be willing to give a final report as to the effect on the vision of the child a fortnight or a month after he ceased treating the child. Thin scars may clear considerably, conditions may relapse without the doctor in attendance. Probably the best undertaking of the sort of evaluation that Mr. Meyer mentioned is the question that is going on now in the state of Massachusetts. Dr. Bigelow, of the Commission there, queries most persons' facts and figures. He is sending out and trying to get an ophthalmological evaluation, one, two, three, four and five years after the inflammatory conditions have been reported and treated, having these nurses route them in to an ophthalmologist. When that is completed we will have a base line established and a set of figures from which we may work and work for comparative purposes.

I hope that those figures will shortly be completed and published. And I hope here in Chicago, where in Dr. Bundesen's office you have the most marvelous system of records I have ever seen, that a similar base line may be established, and at several points both for state-wide purposes and for city purposes we may have satisfactory figures for comparative purposes and real guides.

CHAIRMAN CHESLEY: Another study which is being undertaken by several states at the present time which will give some very valuable information to the profession and some which may apply in this particular field of endeavor is the study of maternal deaths. A committee was appointed by the Children's Bureau to study the causes of maternal deaths. A form was drawn up for the collection of information so that it might be tabulated uniformly in the different parts of the country, and the State Health Departments have been urged to undertake, in co-operation with the state medical societies, such a study, employing for the purpose the best qualified specialist whose services could be obtained.

I am pleased to announce that only yesterday afternoon the Department of Administration and Finance in Minnesota authorized the State Board to go ahead with this program. We have secured the services of a gentleman who has had about six years' special training, five of which were in Ann Arbor under Dr. Peterson. We believe that the results of a study undertaken as soon as possible after the maternal death occurs by a personal visit to the physician or midwife, following up every source of information, will give the medical profession some very valuable data that may apply also to the prevention of blindness, especially where venereal infections apply.

I am very much pleased to note that Dr. Snow has just arrived; although he has not had the privilege of hearing these papers this morning, we will ask him to go ahead and discuss the papers and anything else that he has in mind.

Dr. William F. Snow (General Director, American Social Hygiene Association, New York City): Mr. Van Cleve says the papers were all right, therefore I should like to say that is my opinion. That is all the discussion I am qualified to contribute because of the delay in arrival of my train. However, I heard one paper given day before yesterday in Kansas City by Dr. Royer, which I would like to add to the list and say that it was all right also. Dr. Royer gave one of the most interesting talks I have heard about prevention of blindness, his talk being adapted to the interests and to the stimulation of work by the nursing profession.

I have said to other groups that my interest in the venereal disease problem, as Dr. Chesley knows, began because I had met a great many ophthalmological cases of what seemed to be preventable end products of syphilis and of gonococcus infections. As I began to talk with other physicians and health officers, I found them very much interested but uncertain as to what could be done. Your honored President was one of those who told me to go back to California and see what I, as State Health Commissioner, could do with ophthalmia neonatorum. As I have followed this movement since then, I have realized that from the public health officer's point of view this problem of prevention of visual impairments due to venereal diseases is increasingly a question of his co-operation with the medical profession and the general lay public. Individual physicians and individual citizens and the U. S. Public Health Service are complementary to each other in this work.

Of course, I think the whole problem of venereal diseases must inevitably be a problem of early diagnosis and treatment by the private practitioner because these infections are transmitted by intimate human contact from infected persons to susceptible persons, and it is only the rank and file of the medical profession who have the opportunity to see and advise most of these cases in the early beginning of their infections.

Among the members of the medical profession it seems to me the ophthalmologists have an unusual opportunity to detect cases and to suggest to their confrères who are internists the importance of looking for eye stigmata that are invaluable in getting persons under treatment and keeping them under observation. Without such help the health officer has to class many of these among the missed cases.

Then, too, it seems to me Dr. Royer made a point in talking about ophthalmia neonatorum with the nurses in Kansas City yesterday. He said we may talk about exposure to gonococcal infection of babies' eyes in the language of preventive medicine, diagnosis and treatment, and of what we may do by combined co-operation of the public and the medical profession, without any of the complicating inhibitions or prejudices that confuse the question of prophylaxis for

adult persons exposed to infection. The ophthalmologist, by his contact with people on the one hand and his fellow practitioners on the other, can do an enormous amount quietly to educate a broad point of view about these diseases.

The question of chemical prophylaxis in venereal diseases is one which you know, by and large, splits us all up. The medical profession recognizes that scientifically we have here a thoroughly sound and a demonstrated principle of preventing the development of infection after presumable or known exposure to these diseases. In armies and navies we can get good results because we can control to a very large degree the conditions under which such prophylaxis is promptly and thoroughly administered under supervision after exposure and can have medical inspection to detect infections of those in which prophylaxis may fail.

It is quite natural that many should reason that if this is a sound principle and it has been applied successfully in armies, it must be of equal importance in civil life. I think some of you may have seen the letters that have been appearing in *The Independent* last summer. Dr. Bigelow asked in the first letter whether people are afraid to advocate chemical prophylaxis? The correspondence as printed shows that neither Dr. Bigelow nor his critics and supporters are considering this question on a purely scientific and practical administration basis.

I think again the ophthalmologists and all of us interested in the prevention of blindness have something to contribute in the way of making clear to the public that chemical prophylaxis applied to a baby's eyes is successful because it is applied at once, is done thoroughly by a trained person, and is followed up until it is certain that infection has been prevented.

This great preventive measure has been supported by the public. It is something that works, we have proved it, we have made it a matter of law; all ranks of people—religious, social, professional—are informed about it.

To my mind chemical prophylaxis for adults exposed to venereal diseases cannot succeed until equally thorough measures have been worked out for applying it. To date only physicians applying such measures as "early treatment" to their private patients are accomplishing much in this direction in civil life. In other words, it is not a public health measure of any practical importance. This is so important that I would like to restate the difficulty: For chemical prophylaxis after exposure of a newborn child's eyes we don't say to the child, "you treat yourself"; we don't say to the mother, "you treat the child." We say that the doctor or his trained assistants must administer the prophylactic treatment. We require the child to be under subsequent observation and the ophthalmologist is called in at once if any inflammatory condition or anything suggesting danger to the eyes arises. In other words, we have intelligent trained supervision of the preventive measures and their follow-up. That is what we have approximated in the army in using prophylaxis in adult life. Until we can devise an administrative scheme whereby

the same careful application of a series of steps can be applied to adults in civilian life, I think communities will not support the health officer in efforts to promote chemical prophylaxis for venereal diseases. And until we have solved this phase of the problem, we do not need to get tangled up in the difficulties of the so-called moral issues related to it. Both syphilis and gonococcus infections are such a large and important factor in eye diseases and their sequelæ that ophthalmologists should be greatly interested in promoting the efforts of our National Committee for the Prevention of Blindness in its co-operation with the American Social Hygiene Association and other agencies in combating these diseases.

CHAIRMAN CHESLEY: I think it would be quite appropriate for Dr. Jackson to continue this discussion.

DR. EDWARD JACKSON (Denver, Colorado): Mr. Chairman, Ladies and Gentlemen: One subject has been more or less discussed this morning and that is the education with reference to these health matters. Different methods and avenues of education have been referred to. Progress in the prevention of this class of causes of blindness will be attained by extending education and pushing it beyond what we now think are the limits. Carrying certain lines of education into the public schools, into the high schools, might be followed actively in bringing school authorities and educators to be interested in it more rapidly, in other directions as well as the venereal causes of blindness. But the prevention of such blindness is very intimately interwoven with the prevention of venereal disease. That has come to be more and more appreciated since these questions have been discussed.

We had from the last speaker a suggestion that ought to be brought before ophthalmologists, that they have a position of strategic advantage in educating the public as to the prevention of blindness from venereal disease, through the checking and prevention of venereal disease. They do not immediately run up against apparently insurmountable obstacles that surround the question in other directions. Having that advantage of position, they will be able to utilize it only if they become really interested. Take the facts that have been brought out in the papers of Dr. Green and Dr. Benedict, and make them current in the medical profession, and spread information among patients. That is the great educational opportunity of every physician.

CHAIRMAN CHESLEY: I wonder if there are other questions in regard to these papers.

DR. GREEN: I should like to ask Dr. Jones whether the cases of the fines assessed against the midwives and the doctors for failure to report cases of ophthalmia neonatorum arose in cases in which the babies had gone blind or almost blind or whether they were merely cases which happened to come to the attention of the social workers. In St. Louis, the only convictions that we have secured have been in the cases of midwives where the child's eyes were already irreparably damaged.

There was one other question I had. I gained the impression that when they found positive smears from babies' eyes in cases of ophthalmia neonatorum, that is, I assume the smears of gonococcus, the case was then turned over to the Illinois Society for the Prevention of Blindness and follow-up was made under those circumstances. I may be wrong in this, but it seems to me that every case of inflammatory condition in the baby, whether gonococcal or otherwise, requires follow-up until a cure is definitely established. We very positively know that gonococcus is by no means the infecting agent in all, perhaps not even in the majority, of cases.

DR. JONES: The convictions and fines of physicians and midwives in Chicago were obtained on their failure to comply with the ordinance on reporting diseases. I believe that to recover for an injury would necessitate a civil suit conducted by the parent. I think in the majority of these cases where fines were imposed they were in connection with infants who had lost their sight wholly or partially.

Replying to your question relative to the follow-up of these cases that our nurses find, it is the gonococcus cases that are referred to the Illinois Society, the Department standing as an agency ready to assist the Illinois Society should they meet conditions which they are unable to control. By that I mean to say that gonococcus infections are considered a communicable disease and a department of health should proceed along the known lines of control of communicable diseases, forcibly hospitalizing, if necessary.

MR. GEORGE F. MEYER: At the risk of interjecting myself into a discussion that has been confined very largely to the medical profession, I do want to express a word of appreciation for the inspiration that this has been to me and I know to other lay persons present. I became interested in this aspect of prevention of blindness a couple of years ago when I noticed how large a number of the children in our sight-saving classes seemed to have a history of venereal infection of some kind. Several times I discussed it with Mr. Carris and the National Committee for the Prevention of Blindness, and I am very glad that they have taken such a keen and active interest in running down this thing and seeing what can be done about it.

I recollect quite distinctly at one or two discussions that we thought of how intricate, how far-reaching the ramifications of such a campaign might be, and it seems to me that this meeting with the Illinois Society has been just a revelation of that. It has indeed been an inspiration to see how the doctors represented here have taken the social aspects of the case in hand, and have treated them so thoroughly and so frankly.

I wish that more of our workers for the blind could appreciate the far-reaching aspects of it. I happen to be President of the State Council of Agencies for the Blind in Minnesota, and we have a Committee for the Prevention of Blindness under the State Council. That Committee has been undertaking various studies with reference to the prevention of blindness, and it has now under considera-

tion the taking up of this very aspect. I think no one can appreciate better than a doctor how pigeon-holed are the professional activities of our various groups, and I think this meeting today represents a long step in the direction of getting co-operation between the workers for the prevention of blindness and workers for the blind, who are interested in it strictly from the standpoint of blindness, and see it from the damage which it does. That is something that you people don't quite see. You see the medical result of it, and that is very discouraging, but when you have to work with these people and help them adjust themselves, you get something different from that, even, and it seems to me if we could get that horsepower to work, co-operating with these agencies which are trying to prevent social disease, we would have an element of publicity that would be extremely powerful. After all, as I analyze it, one of the greatest bars toward the advancement of prevention of venereal diseases and all that goes with them is the social bugaboo which seems to hover around the discussion of the entire question. That might be bridged in part if we could have more of this discussion put over to our workers for the blind and use this network of publicity which we have to break the way for the doctor and the social worker.

I was especially interested in Dr. Cornell's analysis of the infections other than gonococcal contributing to poor vision. In medical reading I have run across hints of this, and just the other day, in talking to a Parent-Teachers' organization on "The Prevention of Blindness," I made bold to accentuate the point which Dr. Cornell made, quite considerably, perhaps more than I should have, but it seemed to me that it might make these people much more willing to think about a problem which they would not otherwise have considered at all. A great many people have refused to think about gonorrheal infection because it has a bad social history—there is something distasteful about it. When people realize that pneumococci and other sources of infection may cause those same eye troubles, it is natural that they should become less chary of discussion. So it would seem that some of our social workers might carry that point away from this meeting and use it as an entering wedge in places where it is needed.

I want again to express the appreciation of the people who are here who are not in the medical profession, and have you know that we certainly have derived a great deal from the discussion.

Dr. Jackson: We were all very glad to see Dr. Howe here this morning and I think we would be gratified still more if we could hear him speak and he could speak from a different point of view from any one else here. I think if we hear his judgment of what has happened since he first brought this before the American Ophthalmological Society it would be an inspiration to us for the future.

Dr. Lucien Howe (Director, Howe Laboratory of Ophthalmology, Harvard University, Cambridge, Massachusetts): I have nothing new to say at all. You know just as well as I do. As I was sitting there I was thinking of the man to whom we owe more than

to any one else, that is, to a former New York State Senator, John Laughlin.

One morning when I went into my office I saw a woman poorly dressed in a corner, with a baby on her arm and, as every doctor sees the children first, I invited her in. As I noticed that the lids of the infant were collapsed I asked her who the midwife was, and who the doctor was, and a good many questions. Then I looked at the eyes. I tried to lift up the lid of one eye but there was no eye there. I looked at the other, and there was no eye there either. A scene followed, for the woman saw the truth. She bent over, she cried, she rocked herself back and forth, while the little child smiled. The office nurse let them out.

As they went, State Senator John Laughlin entered. He had come with his mother who had cataract. "What's the matter with that baby?" he asked. I didn't want to discuss it with him, and simply told him there was nothing to be done, that we had tried to talk to midwives and mothers and had tried to have them understand the necessity of precautions but we had no law to control them, as we should have.

But this big, raw-boned Irishman with a big heart and big ideas, struck his fists together and swore and said: "We'll make 'em!" And he did make them. A few days later he came to my office with his mother and together we drew up a law. We put teeth and claws in it, and it was taken to Albany. They asked: "What do you want to pick on those midwives for? That thing hurts. Did you ever have that in your eye?"

"Yes," I answered, "it does hurt, but that is the only way to keep those children from becoming blind."

Well, we failed, and we tried it again. It may have been a third time, and at last the bill passed. Now we have a law in some form in nearly every state. It was not a doctor, it was a political boss, who started the thing, and John Laughlin's name should be remembered for it.

CHAIRMAN CHESLEY: I would like to call on Dr. Lueddé of St. Louis.

DR. W. H. LUEDDE (St. Louis, Missouri): Any one in discussing the papers and instructions that have been given this morning can only emphasize what has been said, and perhaps in doing so will be discharging a duty that every one who is interested in this work should be willing to discharge. I was particularly impressed with the fact that Dr. Jones spoke of the follow-up work. Only a few days ago a child came to my notice who had had prophylaxis at one of our best lying-in institutions in St. Louis, who had left the institution with the mother, and was brought in by the grandmother in a dangerous condition because there had been no follow-up. The child was supposed to have been protected against the dangers of ophthalmia neonatorum. The prophylactic had been used, there was a slight reaction, and nothing seemed to be happening. The child went home in that condition. Then, when a little inflamma-

tion appeared, the parents, the mother and the grandmother, and the relatives, too, tried to take care of the child by treating it through the day, and it would be better by evening, the grandmother said, but every morning its eyes would be closed with purulent secretion. A smear made showed that the gonococcus infection was still present. The money was provided by the Missouri Association for the Blind to secure a nurse for night duty and regular treatment cleared up the condition in a short time. That is an illustration of the importance of follow-up work. Prophylaxis is the great entering wedge and starts these children without the intense danger of immediate infection, but it is only the entering wedge, and we must have the follow-up work in these cases to be successful. Where prophylaxis has been used the attacks usually, as we know clinically, are mild, but they must not be neglected.

I was confronted some years ago with another problem, and sometimes problems tell what we want to say better than theoretical discussion. A young man whom I treated for syphilitic iritis came to me with the proposition that he intended to be married. I said, "Have you frankly told the situation to the young lady?" He had not, but he would. She insisted that the plans for the wedding go on.

I have watched the developments in that case with some interest. He had been very conscientiously treated, according to the knowledge of the day, and later, when arsenicals and other preparations came into use that might be used more effectively, they were used with definite serological control. He tells me that they have frankly used birth control. The word "birth control" is taboo, but it should be practised at times. If we know of syphilitic parents, I think birth control has its place. In this case whenever a possible pregnancy was contemplated, both parents submitted to a course of antisyphilitic treatment and examination as to the presence of syphilis by serological tests, and they have succeeded in having several babies that are free from evidence of syphilis.

The present generation, whatever we say about our young people, has one redeeming trait that all speakers emphasize, frankness, a willingness to face the truth, and I believe the best emphasis that we can give to what has been said this morning is to bring this story with perfect frankness to those to whom it should be told.

CHAIRMAN CHESLEY: I think we would like to hear from the Pennsylvania Council for the Blind, represented by Mrs. Campbell.

MRS. MARY DRANGA CAMPBELL (Pennsylvania Council for the Blind, Harrisburg, Pa.): I did not expect to be called upon to take part in the discussion, as I have not heard all of the papers of the morning. I should, however, like to bring to your attention a report that was made to the Pennsylvania Council for the Blind on October 11, by Dr. Mary Riggs Noble, Chief, Pre-school Section, Bureau of Child Health of the Pennsylvania Department of Health. She gave a most interesting account of the intensive work that her Bureau has undertaken in the control and supervision of midwives in ten counties in the hard and soft coal regions of the state.

In these sections Dr. Noble's Bureau has had control of 520 midwives and in addition has made 325 unlicensed midwives stop practising. Dr. Noble stated that her Bureau had had five years' experience with 23,684 deliveries to December 1, 1926, and from January 1 to June 30, 1927, 3,762 deliveries.

Dr. Noble stated that since the Council for the Blind began to function her Bureau had paid special attention to recording cases of ophthalmia neonatorum. In 1926 they had five cases of ophthalmia neonatorum, all of which cleared up. In the first six months of 1927 they had but one proved case of gonorrheal ophthalmia and one eye was lost. This is a splendid record and both Dr. Noble and Dr. McCreary, Chief of the Bureau of Child Health, state that the use of a prophylactic in the eyes of the newborn by the midwives of Pennsylvania is practically one hundred per cent. Unfortunately, it is far below that per cent among the physicians, and this latter statement is borne out by the number of blind babies that the field representatives of the Council are finding in the surveys of the blind now being made.

The law requiring the use of a prophylactic in the eyes of the newborn by physicians was passed in Pennsylvania in May, 1926, but its use had been obligatory by midwives for some time. It seems to me that if such a high percentage in the use of a prophylactic in the eyes of the newborn can be maintained by midwives, many of them of foreign birth, of advanced age, limited education and practising among a foreign population, surely the physicians in our great state of Pennsylvania, as well as in the rest of the country, ought to maintain a one hundred per cent standard in the use of a prophylactic in the eyes of the newborn, thus eliminating blindness from ophthalmia neonatorum.

CHAIRMAN CHESLEY: Miss Burdge is here; possibly she can tell us something about her work.

MISS ALICE V. BURDGE (Supervisor of Sight-Saving Classes in Southern Ohio, Cincinnati, Ohio): I have supervision of sight-saving classes in six cities, and I have been very, very much interested in this work and in the things that have been said about syphilitic conditions and about the interstitial cases that come up, because we have a great many of them in sight-saving classes throughout the state, and we try to get them for treatment and to follow up that treatment.

I am interested in the report made with reference to the English requirements of treatment. I wonder what percentage of children were in the sight-saving classes in England due to interstitial keratitis and what relation that had to this enforcement of the syphilitic treatment there. Maybe Dr. Green knows.

DR. GREEN: I cannot answer the question. I know that primarily the sight-saving classes in England were started for myopic children. I know that in England there are special schools for children with trachoma. They isolate those children and put them in schools so education will be carried on. I don't think there are any provisions

in this country for special schools of that character. Do you know of any?

MISS BURDGE: I think in Cleveland there was a class for children with trachoma and the trachoma cases were placed by themselves. I don't know whether that is in effect now or not.

DR. GREEN: It is a little surprising to me that those children need to be placed in sight-saving classes. My experience is that adequately treated cases of keratitis will afford sufficient recovery to enable them to carry on.

MISS BURDGE: We are very glad it does in some cases, but in many cases the scars are so bad that the children simply cannot see to read the fine print. We take them only where the vision is below 2/5, and they cannot carry on the work in the regular grades.

CHAIRMAN CHESLEY: I want to call on Dr. Brown.

DR. E. V. L. BROWN (Professor of Ophthalmology, University of Chicago, Chicago, Illinois): I don't know anything especially pertinent that I might add to the matter of the prevention of blindness in the newborn. Somebody ought to give the experiences of the Illinois Society for the Prevention of Blindness in better shape than I can give it. Miss Campbell's unfortunate death last spring left us in such a situation that since all our work had been in her hands for years, there was no one of us among the directors who had it in good shape. Dr. Jones knows about it probably better than any of the people who are among the directors. It has been a marvelous piece of work here under her direction for the last seven or eight years.

The history of the prosecutions of the midwives and of the doctors, graduates of the school in which Dr. Wilder and I were teaching, and the hospitals, including the Presbyterian and St. Luke's, two of our leading hospitals, certainly is an interesting one. Offenders are brought on the carpet again and again. Difficulties of all kinds have not prevented Miss Campbell in the past and Dr. Jones and those who are actively carrying on this work now from securing better and better enforcement of this reporting law.

We have come to feel that the situation in Chicago is so well standardized and so well regulated now that it will go on through regular standards of departmental work with some supervision. The emphasis on the prevention campaign of ophthalmia neonatorum is a little less with us because of the success it has had.

One question was asked: the proportion of colored people with ophthalmia neonatorum. Last year in two hospitals at different times in two weeks there was an epidemic of ophthalmia neonatorum among the colored children, five in one, six in the other, unconnected, apparently. In all cases there was no gonococcus present. In no case was there any loss of vision resulting. There is a large amount of ophthalmia neonatorum of the non-gonococcus origin perhaps among the colored people, I think.

We have such an increasing population of colored people in Chicago that it is difficult to make any comparison. The fact that

they are becoming hospitalized better than they were means considerable. The County Hospital is having an enormous number of patients now compared with fifteen and twenty years ago. I think we can get some figures about the infections among the colored people.

CHAIRMAN CHESLEY: In spite of the fact that we have a short time to finish the discussion, I cannot refrain from asking our old friend, Mr. Van Cleve, to say a word of greeting.

MR. EDWARD M. VAN CLEVE (Principal, New York Institute for the Education of the Blind, New York City): It has been a great joy to me to sit here and listen to these wiseacres who know all about the subject discussing a question that was a few years taboo. This is the day of frankness, and these frank statements of conditions as they are interest me very greatly. Time was when, as perhaps Dr. Snow will recall, in the exercise of the executive function in this organization, I refused to allow the subject which we have been discussing this morning to come before any group for which we were responsible; by which you all may infer that I am a back number. I frankly acknowledge that.

Dr. Mark Stevenson, of very blessed memory in my life (some of you oculists knew him), is chiefly responsible for the attitude of mind which I then assumed, namely, that if we discussed ophthalmia neonatorum as caused exclusively or even principally by the gonococcus, we would close up the ears of the public to a very large extent. Stress the fact that ophthalmia neonatorum may be caused by any one of several germs and the imputation of impurity is eliminated. It may be noted by the comments made here this morning, particularly those of Dr. Cornell, that the other causes of ophthalmia neonatorum are now recognized as they were not by the medical profession fifteen years ago. But there is not the same need for caution. Folks are no longer afraid to face facts; we talk freely about subjects that were forbidden. And yet a leading paper in New York City will not even now allow any comment whatever to be made upon the subject of venereal disease in connection with the prevention of blindness or prevention of any social misfortunes, to use a very mild term.

I am particularly happy to have been here this morning and to have heard Dr. Howe, whom I have always thought of as the father of this movement, tell the story that he did about John Laughlin. I never knew before who was the grandfather of the movement. If Dr. Howe is the father, John Laughlin is the grandfather. His name, as Dr. Howe said, should be immortalized somehow, perhaps with a bronze tablet in the office of the National Committee for the Prevention of Blindness.

CHAIRMAN CHESLEY: You see, Mr. Van Cleve forgot about visual education, probably a subject that he hadn't taken up when he was in this work. If he closed their ears, he opened their eyes. The work of this Committee has been to keep the eyes open so they can

see and read, and even the New York papers won't keep all the information from the public.

I will call upon the gentlemen who gave their papers to close.

Dr. John Green: I was very glad to hear Dr. Schaefer state that, as a part of the examination of syphilitic children, there is required an examination of the eyes by an ophthalmologist. That examination ought to be a searching one. Mere inspection of the anterior segment is insufficient. Every child should be subjected to ophthalmoscopic examination, which must include a search of the periphery of the eyeground.

In my series of 100 syphilitic children, it was surprising how many eyeground lesions were found in the periphery. Many of these children were infants unable to follow your directions as to where to turn the eyes. A little trick in examining infants is to have the nurse hold a flashlight, brighter than the light of the electric ophthalmoscope, in different positions. The child's attention is thus attracted by the bright flashlight and the eyes rotate in the direction in which the light is held.

I believe that my series was the first ophthalmological study in which every case was checked by a Wassermann test. No case was admitted to the series that did not give at least a two plus Wassermann. Many of these children had spinal fluid Wassermanns in addition.

With regard to the treatment of the syphilitic expectant mother, it is certainly gratifying to realize that from ninety to ninety-five per cent of these women may hope for a sound child in the event of adequate treatment throughout the period of pregnancy.

The statistics given by Mr. Roloff are borne out by the investigations of Dr. Fordyce in a New York maternity hospital.

The great tragedy of syphilis is optic atrophy. You have a large negro population in Chicago; we have a tremendous one in St. Louis. The number of blind negroes, men and women, from optic atrophy is simply appalling. The Missouri Commission for the Blind will bear me out in this statement. The negro who has acquired syphilis gets little or no treatment. He certainly does not get enough to prevent the later ravages of the disease. There is almost inevitably a late neurosyphilis, and that neurosyphilis attacks, by preference, the optic nerves.

Dr. E. L. Cornell (Chicago): I thought perhaps you might be interested in the experiment that the state of Illinois is making in Bloomington and in McLean County. About a year ago the State Health Department assigned a nurse to the McLean County Medical Society with the idea in mind that she should call on the newborn baby and render whatever service possible to the baby and the mother; the Medical Society to govern the activities of this nurse. At the present time this nurse obtains the names from the birth certificates, then telephones the physician or midwife in attendance, and asks permission to call on this particular patient.

When the work was first begun, the nurse encountered considerable opposition, especially from the educated women. The ignorant, poor, uneducated woman did not resent the intrusion into her home on the part of a nurse, but the educated women, the college graduate, thought it a tremendous imposition on the part of the nurse to come to her house and offer suggestions. This resulted many times in the closing of the door in the face of the nurse, and she became somewhat discouraged.

Finally, the Medical Society evolved the idea of asking the physician to take this nurse into the home with him and explain the advantages to the patient of having the nurse come in and give any necessary instruction. By the way, that is a point for you if you endeavor to have public health service in the educated home; you cannot handle these patients as you do the average poor clinic case.

The results at the present time seem to be gratifying, except that in one case a nurse had been employed who attempted to make diagnoses. One physician mentioned the fact that one of the nurses (who, by the way, has left) went into the home and saw that the child was a mouthbreather and said to the mother, "You should have this child's tonsils taken out." The tonsils had been removed two weeks previously.

Fifteen years ago, when I started in private practice, most of the obstetrical cases that came to me were six, seven, or eight months' pregnant. They simply came with the idea of having me deliver them. That was not my ideal of the practice of obstetrics. I thought that they ought to have prenatal care, as the term is now understood.

I started obstetrical propaganda by issuing a small book of instructions for use in my private practice. The first book was issued in 1916. Since that time various agencies have published similar books.

As an example of how educated the public has become, I may say that at the present time I am booking cases for May, which means that the last menstrual period was in August, approximately six weeks ago. Fifteen years ago if I had had such a case come into the office I would have thought it strange. Today, the private patient reports earlier than the charity case. Of course, the well-educated, rich and middle class individuals need as much prenatal care as the charity cases, and that is a fact which is being overlooked. We see just as much venereal disease, just as much vaginal infection, in that class as we do in the charity case.

All of our agencies are bent upon educating the public so far as the charity patient is concerned. At least 50 per cent of our efforts should be given to the middle class and well-to-do patient.

CHAIRMAN CHESLEY: In view of Dr. Griswold's illness, might I suggest that the conferees this morning authorize me to send him a wire expressing our sympathy and a hope for his early recovery?

DR. ROYER: I want to take the occasion to express our very great appreciation of this splendid series of papers contributed this morning. I am sure these contributions are going to be of a very great deal of value in the field of the prevention of blindness.

There was one problem I expected these two gentlemen from Missouri to stack up before us to show us the size. When you are from Missouri, you want to be shown. I don't remember that any person said what percentage of blindness in this country is due to syphilis, from birth to old age. What is the percentage of blindness due to birth infections of the eyes? They do have that data in Missouri, and it is the only state in the Union that has it.

Dr. Harvey Lamb has worked up an analysis of some 6,000 persons who have come under the pension laws of that state. He states that fifteen per cent of those that are blind are blind because of syphilitic infection. That is a problem. The birth infection is about three per cent. He might have added a perfectly tremendous additional list with the most profound impairment of vision not yet classified as blindness, also due to syphilis, so that you have there a great big problem to face.

I mention that fact. These ophthalmologists all know it, but you social workers are not quite so familiar with the size of the problem.

Section II

Eye Accidents in Industry

Lewis H. Carris
Harry Guilbert } *Joint Chairmen*

National Safety Council
National Committee for the Prevention of Blindness

Eye Accidents in Industry

Lewis H. Carris and Harry Guilbert, *Joint Chairmen*

Chairman Carris: Mr. Walter G. King, who has done so much in the work of preventing eye accidents and who until a few weeks ago was President of the National Safety Council, had expected to preside at this meeting, but he was called to Europe. We had hoped to get his successor in office, but that proved impracticable on account of his absence from the city, as I understand it. So in the absence of the President of the National Safety Council, I will open the meeting and preside for a short time, and after that give the chair over to the man who makes a good chairman as well as a good talker, Harry Guilbert, of this city.

Before the program formally begins, I want to say a word of appreciation of the hearty co-operation extended to the National Committee in this Conference by the National Safety Council itself. This is especially noteworthy at the present time because of the fact that just two or three weeks ago they had their large annual meeting.

The National Safety Council, as you all know, is engaged in the prevention of all kinds of industrial hazards and accidents and has done noteworthy work in the field of conservation of vision. The National Committee for the Prevention of Blindness fits into the program by emphasizing, as far as it can throughout the country, that particular form of industrial hazard which is known as eye accidents.

We, of course, in the National Committee, see a great deal of the results of blindness, and know, perhaps better than the industrial people themselves, the misery which is entailed by blindness.

This program this morning is to emphasize the eye accidents and the ways in which they can be prevented, and the first speaker is to speak on "The Economic Aspect of Industrial Eye Injuries as Reflected in Workmen's Compensation Laws, in Compensation Payments, and in the True Cost of Eye Accidents." We are very fortunate in having Mr. Stewart J. Owen, Jr., Safety Engineer of the National Safety Council, with us to give this address.

The Economic Aspect of Industrial Eye Injuries

STEWART J. OWEN, JR.
National Safety Council, Chicago, Illinois

The economic aspect of industrial eye injuries is a subject that covers a vast and important field which possesses enough material for a volume of many pages. While temporary disabilities due to industrial eye injuries are very numerous, I shall confine this article to eye accidents which have resulted in permanent total disability and permanent partial disability, and will briefly discuss such injuries from three viewpoints: (1) As reflected in workmen's compensation laws; (2) as reflected in compensation payments; and (3) as reflected in the "true" cost of such accidents.

Workmen's Compensation Laws.—There are but four states that do not have compensation insurance laws. Those states are Florida, Mississippi, North Carolina, and South Carolina. In the District of Columbia only the civil employees of the city of Washington and of the Federal Government are protected by compensation laws. In most of the states compensation is not allowed under the following conditions: (1) If the injured employee is intoxicated at the time of injury; (2) if the injury is due to willful misconduct on the part of the injured employee; and (3) if the injury is due to willful intention of the injured employee to injure himself or another. In some instances no compensation is allowed when the injury is due to willful failure of the injured employee to use the protectors provided or because the employee has failed to obey safety laws or rules.

The amount of compensation that may be received for the loss of one or both eyes varies in the several states. However, all states consider a man who loses one eye as being permanently partially disabled and one who loses the sight of both eyes as permanently totally disabled. While it would be of value to list the compensation provision from all the states, particularly in regard to eye disability cases, I believe you will have a fair idea of such provisions if I read those of the larger industrial states.

State	Loss of One Eye	Loss of Both Eyes
California	65 per cent of average wages for various periods depending upon occupation of injured, age, and diminished ability to compete in open labor market.	65 per cent of average wages for 240 weeks, then 40 per cent for life.

State	Loss of One Eye	Loss of Both Eyes
Connecticut	104 weeks average wages.	50 per cent of average wages not to exceed 520 weeks; maximum $21 per week; minimum $5 per week.
Illinois	50 per cent of average weekly wage for 110 weeks.	50 to 65 per cent of average wages for 8 years; maximum $14 to $19; minimum $7.50 to $14.
Massachusetts	⅔ average weekly wages for 50 weeks. Maximum $10 per week. Minimum $4 per week.	66⅔ per cent of average weekly wages for not over 500 weeks; weekly maximum $16; minimum $7. Total not over $4,000.
New Jersey	66⅔ per cent of average wages for 100 weeks.	66⅔ per cent of average wages for 400 weeks; maximum $20; minimum $8 or actual wages.
New York	66⅔ per cent of average wages for 160 weeks.	66⅔ per cent of average wages for life; maximum $20; minimum $8 or full wages.
Ohio	66⅔ per cent of average wages for 100 weeks.	66⅔ per cent of average wages for life; maximum $18.75; minimum $5.00 or actual wages.
Pennsylvania	60 per cent of average wages for 125 weeks.	60 per cent of average wages for not over 500 weeks; maximum $12; minimum $6 or actual wages; total not over $5,000.

It is to be seen that while the per cent of average earnings is 66⅔ per cent in the case of total permanent disability, such as the loss of sight of both eyes, not all of the states cited pay such compensation for the remainder of the disabled man's life. Such being the case, sooner or later a man who has lost the sight of both of his eyes is very liable to become a public charge and depend upon society in general, not only for his own support but also for the support of his family, especially when the children of such a man are not of sufficient age to earn the funds necessary for that family's bare necessities of life, to say nothing about other well recognized family expenditures.

Compensation Payments.—The compensation records of the several states show large sums of money are awarded each year because of industrial eye accidents and that such compensation payments form a very large percentage of the total compensation awarded for all industrial accidents.

In the state of Pennsylvania for the year ending December 1, 1926, the loss of eyes amounted to 570 or 13 per cent of a total of 4,258 compensated permanent injuries. The compensation awarded because of these 570 lost eyes was $858,896, or nearly 26 per cent of the total award for all compensated permanent injuries. The records of that state for the past eleven years show the number of

eyes lost in industrial work as 6,398 or 28 per cent of the total of 22,708 compensated permanent injuries. The compensation awarded for these 6,398 eye accidents amounted to $8,788,391 or 36 per cent of the total award of $24,326,064 for all compensated permanent injuries in that state during the eleven year period.

The compensation records of the state of New York for the year ending June 30, 1926, show that 349 persons lost the sight of one eye. That is 26.6 per cent of all persons permanently partially disabled. The records also show that 363 additional employees suffered partial loss of the sight of one eye and that seven employees met with a partial loss of sight of both eyes. The loss of time due to these permanent partial disability eye cases resulted in 71,754 weeks of lost time. The compensation awarded because of these injuries amounted to $1,301,568 or approximately 10 per cent of the $13,859,140 awarded for all compensated injuries.

The sum, $2,160,464, is a great deal of money. You can travel from Chicago to New York and return on the Twentieth Century 21,000 times. It will pay the salary of a man earning $1,800 per year for 1200 years. You may build 254 houses at $8,500 each. Winter coal for 18,000 families may be purchased allowing eight tons per family with the coal at $15.00 per ton. If you desire to purchase goggles for your men, you may buy 1,440,300 pairs at $1.50 a pair.

Figures of other states might be cited but I believe that the records of the two states as given above will give you a fair picture of the cost of compensation payments in the larger industrial states.

"True" Cost of Industrial Eye Accidents.—There is no way to compute the "true" cost of industrial eye accidents. While it is a fact that large sums are awarded to such disabled men, no compensation award, however large, can ever offset the loss suffered by a worker who loses one or both of his eyes. The loss of the sight of one eye works a decided handicap on an employee. He knows that if he loses the sight of his good eye he is done for industrially and his earning power is at an end.

When a worker has lost the sight of both eyes, he suffers a twofold loss: the loss of his sight and the loss of earning power necessary to maintain those he holds near and dear. He knows it may mean the giving up of all he has and in the end becoming dependent upon others. He knows that it may mean the loss of his home and all that he possesses.

No one except a person who has enjoyed the sight of two good eyes and who has forever lost the sight of them really understands or

knows what such a loss means to that man. Think what it means! Close your eyes for an instant and ask yourself what you would do if you were never again to see the bright things of this world, if you were to be for the remainder of your life in a world of darkness. You would not again see the smiling and happy faces of your children, the tender smile of your devoted wife or the friendly expression of those about you.

It can be truly said that only two know what the loss of sight to a worker means. They are the worker who has suffered such a loss, and his Maker.

Discussion

CHAIRMAN CARRIS: These are valuable statistics. Some of us don't have a head for figures and we appreciate the way in which Mr. Owen has visualized the ways in which expenditures could be made. Our minds run along many ways in which we could use that money. We hope the time will come when we won't have to spend it. That, of course, is our aim.

Are there any questions that any of you would like to ask Mr. Owen about his paper before we proceed?

MR. OWEN: The National Safety Council, of course, is always willing to help along in the prevention of eye accidents as well as other injuries as far as it possibly can.

CHAIRMAN CARRIS: I understand all these exhibits are due to the interest of the next speaker. Those of us who have heard him talk know how entertaining he is, how energetic he is, and it is always a great privilege to hear him talk. I am going to do something more than that, I am going to ask him to deliver the next paper and after that to take charge of the meeting.

This session is one of the week's conferences which are being held here by the Illinois Society for the Prevention of Blindness and the National Committee for the Prevention of Blindness. The National Committee for the Prevention of Blindness tries to work on a co-operative basis. We have co-operated in this particular series of meetings with the National Safety Council, with the local Ophthalmological Society, which really is having a special meeting of the ophthalmologists of the city to discuss the prevention of blindness. We had a joint meeting yesterday afternoon with the illuminating engineers up at the Edgewater Beach Hotel, and some of us joined them in their banquet last night.

It is now my very great privilege to call on Mr. Guilbert. I hope I shall know him some time well enough to call him Harry, like all of his friends do. He will now address us.

Preventing Industrial Eye Injuries

HARRY GUILBERT

Director, Bureau of Safety and Welfare, The Pullman Company, Pullman, Ill.

One of the most difficult phases of accident prevention is to persuade workmen to protect their most valuable asset—sight. The Repair Shops of the Pullman Company are the only ones in the United States where goggles are worn universally. This was accomplished in the face of ridicule, opposition, ignorance, indifference and lack of co-operation on the part of the men themselves.

There is no doubt that goggles are essential for humanitarian and economic reasons. The former reason needs no explanation. The latter is answered by losses in the states of Pennsylvania and New York alone. How about the remaining 46 states? New York paid out in compensation $1,703,235 for eye accidents last year, and assuming that compensation payments to employees constituted only 20 per cent of the total cost of accidents to the employers, these accidents cost the state $8,516,175 in twelve months. In Pennsylvania 6,842 eyes were destroyed since 1916. Included in this figure are 175 cases in which both eyes were lost. From January 1, 1927, to October, 1927, 383 eyes were totally destroyed in various types of industry, from coal mining to work in restaurants. In the year 1925, Pennsylvania paid out $886,599 in compensation alone. Conservatively speaking, this represents an economic loss of about $5,000,000.

In any campaign against eye injuries, one of the first essentials is the support of the management. Our president, Mr. Edward F. Carry, is in full accord with our efforts, has always backed us to the limit and, what is more to the point, has spared no expense to bring about the desired results.

The establishment of eye safety devices in any industrial plant requires a thorough evaluation of different types of goggles. While this is a subject in itself, I shall touch upon it briefly. There are goggles for every conceivable type of hazard, from hot metal to dust. The most expensive goggles are the cheapest, because of durability, comfort and increased safety. A good goggle lens should be strong enough to resist all ordinary impacts; have a clean surface, free from waves and scratches; be relatively free from prisms; and be

relatively free from focus. The strength of goggles is determined easily by drop tests which approximate the impact of a flying article. To give real protection a lens should stand a test of a 5/8" steel ball dropped at least 55" to 60." Any test less than 40" can be met by ordinary Crown optical glass, unhardened. In any heavy impact goggle, an unhardened lens is valueless.

A good surface is without doubt the most outstanding quality necessary in a good lens. It determines the clarity of definition of objects viewed. Surface cannot be tested by a transit instrument which only shows up prismatic qualities of the lens. Tests for surface can best be made in a laboratory with scientific equipment. If you do test lenses for surface, hold the lens under a strong light and look at it from an angle, at least from six to eight inches away. Better still move the lens under the light so as to get the light rays striking the surface at different angles and you will readily pick out scratches, pits, grayness, waves—the real surface defects.

The one lens quality a transit test exposes is the prismatic quality. Do not be stampeded by such a test, however. Every lens has some prismatic power, varying from 1/8 to 1/3 diopter or higher. Anything below 1/4 prism diopter is so slight as to cause no muscular exertion in accommodation. Much has been written lately about goggle lenses being free from prisms to two minutes of an arc, or 1/17 prism diopter. This simply means actual displacement of the object viewed—such an infinitesimal amount as to be entirely incomprehensive to the eye and a displacement that is actually exceeded in wearing glasses daily when the facial muscles contract or expand, lifting or moving the frame and the lenses so as to displace mechanically the objects viewed. Consequently, such a requirement, while interesting scientifically, is unnecessary and should be recognized by the layman as one that actually has no bearing whatsoever on the surface qualities of the lens, its strength, or its focal qualities.

Every lens should have some positive focus, preferably 1/8 or 1/4 diopter. This focus should be positive—never negative, because the eye is normally focused to a distant object. Most industrial operations, however, require close application and goggle wearers specifically work with the object viewed very close to the eye. Therefore, a slight positive focus actually assists the eye in cutting down the muscular accommodation necessary, rather than causing eyestrain.

It is imperative that the new man be provided with properly fitted goggles before he starts on the job. He should also be furnished

with a metal case in which to keep them. Such a case is a wise investment inasmuch as it prolongs the life of the goggles.

In order to encourage men to wear goggles consistently, it is absolutely essential that superintendents, managers, foremen and leaders set the example for the workmen by protecting their own sight. Imagine a chipper's reaction when his foreman, without goggles, stands in the danger zone and asks the workman why he is not wearing his! Goggles must be fitted correctly to the individual employee. No two noses are alike, therefore the new workman must be provided with goggles fitted to his particular nose. Periodical adjustments of the goggles must be made, daily if necessary. The safety inspector should have a pocket repair kit which will enable him to make adjustments and repairs right on the job if necessary. Visitors, irrespective of their station, should never be permitted to walk through the various departments unless their eyes are protected.

Another topic which is a subject in itself but which I will touch upon briefly is defective vision. It is a subject which has been greatly exaggerated for ulterior motives. Our employees are given a pair of stock goggles, that is, goggles containing Plano lenses, and if, after a fair trial, the recipient complains, then he or she is given an eye examination and is furnished with special goggles. These goggles cost from $4.00 to $6.00 a pair, for which the Company pays.

Herman P. Davidson, M.D., oculist at Pullman Car Works, made an examination of the eyes of 4,000 men, which developed the following:

Table No. 1.—Tabulation of 4,000 Cases According to Vision Without Corrective Lenses.

No.	Per Cent	Vision	Without Lenses
1,139	28.48	normal	(20/20 to 20/15)
1,151	28.77	92%*	(20/25 to 20/30)
298	7.45	85%*	(20/40)
246	6.15	79%*	(20/50)
229	5.73	66%*	(20/70)
190	4.75	35%*	(20/100)
696	17.40	5%*	(20/200)
51	1.27	only one eye	

* From the Chicago Ophthalmological Society and State of Wisconsin Tables of Compensation for Loss of Vision.

Table No. 2.—Tabulation of 2,861 Cases of Subnormal Vision on the Basis of the Improvement Possible With Lenses.

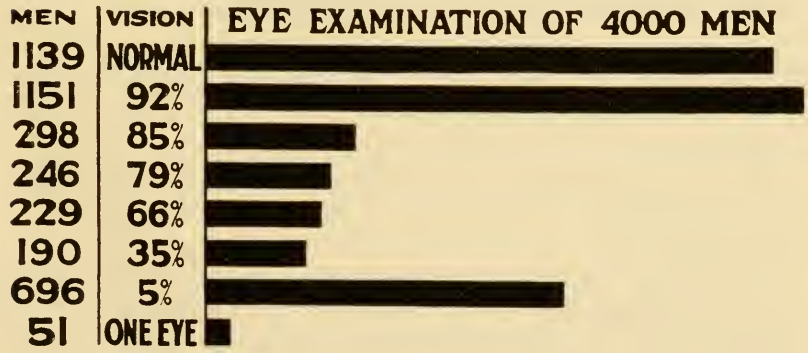
No.	Per Cent	Vision	With Lenses
400	14.0	normal	(20/20 to 20/15)
465	16.2	92%*	(20/25 to 20/30)
129	4.5	85%*	(20/40)
66	2.3	79%*	(20/50)
53	1.9	66%*	(20/70)
28	1.0	35%*	(20/100)
1,141	39.9	More or less improvement possible	
1,720	60.1	Cannot be improved by lenses.	

* From the Chicago Ophthalmological Society and State of Wisconsin Tables of Compensation for Loss of Vision.

In Table No. 1, the first 4,000 cases seen consecutively are tabulated according to vision without any corrective lenses being placed before the eyes. In analyzing the record of these consecutive tests of vision, the worse eye was always tabulated. For example, a man may have an amblyopia in one eye with vision of 20/200, while the other eye is normal. This case would go under the 20/200 tabulation. There is one other item that needs explanation, and that is the 17.4 per cent who have only 20/200 vision. This class includes many men around 60 years of age whose vision can be brought up to about 20/30 by lenses. It also contains some cases of amblyopia which cannot be improved.

Table No. 1 shows 1,139 cases of normal vision and 2,861 cases of subnormal vision, equal to 28.5 per cent, and 71.5 per cent, respectively, of the total 4,000 cases. Many of the 2,861 subnormal visions can be improved by lenses. These cases are tabulated separately on this basis in Table No. 2.

Further analysis of the 4,000 cases gives the following facts: 1,139 cases, or 28.5 per cent, have normal vision without lenses, and 400 cases, or 10 per cent, can be brought to normal by lenses. This makes a total of 38.5 per cent who are or can be made normal, leaving 61.5 per cent whose sight cannot be made normal by glasses.



Some of these men are "letter ignorant" and the exact status of their visual acuity is difficult to determine. If we accept 20/30 as near enough to normal vision for practical purposes, we have 2,290, or 57.25 per cent, who have good vision without lenses. This, of course, gives a rosier picture. Still, it is questionable to say that all of these men are "letter ignorant"; some undoubtedly are, but many have defective eyesight. In this series, no effort was made

to differentiate between "letter ignorant," beginning sclerosis of the lens in senile eyes, scars of the cornea, cataracts, or fundus lesions. The vision was the tabulating factor, regardless of the etiology of the loss of vision.

Of those of the original 4,000 patients who had normal vision, some have lost their good vision. For example, one man developed optic atrophy and lost most of his vision; another "leader" lost his son and went on a protracted drinking bout, returning three months later with a vision of 7/200 with optic atrophy. The latter had an excellent record with the Company and wanted to begin again as a band sawyer. Needless to say, with that vision he was not safe on a saw.

One of the surprises in this series was a young albino who had nystagmus and wore highly astigmatic hyperopic lenses. With these lenses he could get only 20/200 vision in either eye. He was followed up, and his leader reported that he was one of the best cabinet makers in the shop. This man made up in feeling what he lacked in vision, but he is an exception to the rule. Most men with very poor vision are poor workmen.

In summarizing this study, the following facts are of interest:

1. Of 4,000 men consecutively examined 1,139, or 28.48 per cent, had normal vision in both eyes without lenses; 1,539, or 38.48 per cent, had normal vision in both eyes with lenses.

2. There is an appalling number of amblyopias, maldevelopments, and old injuries in the eyes of industrial employees.

3. The average employee has still to be educated as to the industrial eye hazard he takes without goggles.

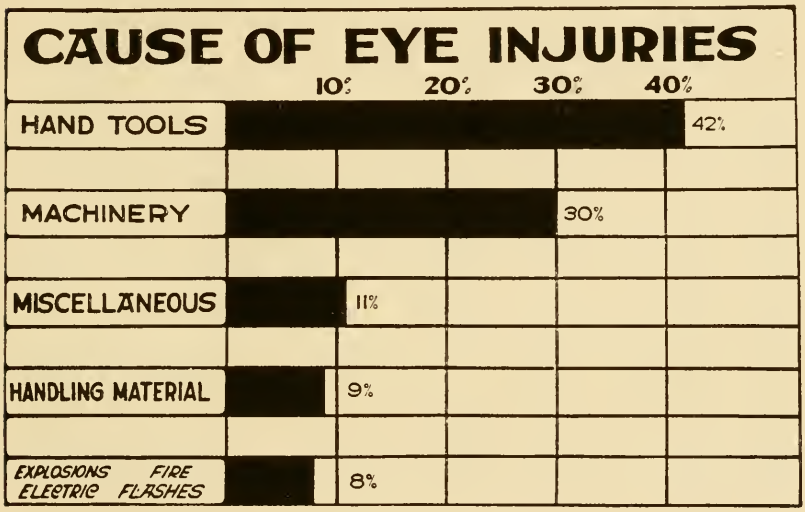
4. The employee should be instructed that neglected crossed-eyes and defective vision in his family are hazardous to eyesight conservation.

I have been requested repeatedly to draw up a list of occupations hazardous to the sight. We all know that men handling hot metal are more exposed to eye injuries than men engaged in upholstering furniture. Yet I know of two upholsterers who lost eyes when struck by pieces of broken needles. An expenditure of $2.00 would have afforded them complete protection and saved approximately $6,000 in compensation, to say nothing of two eyes.

Some companies insist that men engaged in occupations such as grinding, handling hot metal, chipping, riveting, bucking, boiler making, etc., wear goggles. However, painters, glaziers, wood workers, upholsterers, carpenters, plasterers, etc., have been known

to lose eyes. What is the answer? Goggles! They are a good sound investment for obvious reasons in any occupation.

To illustrate this need of goggles in all industries I will cite some unusual industrial eye accidents: When a band saw broke, a portion of the guide wheel struck a passing workman in the eye, completely destroying it. A man mixing mortar and plaster lost the sight of an eye when some small particles of material entered it. A watchman struck his head against a beam, dislodging the seeing cells, which completely destroyed the sight of an eye. A workman eating lunch broke a piece of bread, a crumb of which entered his eye, causing partial loss of vision. A man wearing goggles had the sight of an eye completely destroyed when whitewash entered side screen.



The following non-industrial eye accidents are also unusual: A baby scratched its father's eye with finger-nail. A man scratched his eye on a gooseberry bush. A girl stuck a hot curling iron in her eye. Bursting automobile tires have injured vision. A man blew his breath into a coffee percolator and splashed hot coffee in his eye. Tincture of iodine has been mistaken for argyrol and used in the eye. An icicle fell off of a roof, striking a person in the eye. A man had the cornea of his eye scratched with his wife's hair-pin. A dentist received a chip from a tooth in his eye. Insects sometimes get in the eye, and are very painful on account of their acid secretion. Golf balls, fire crackers, small shot, flying nails, sling-shots, air guns, bows and arrows, broken glass, etc., have all played a part in destroying vision.

In pre-prohibition days many bartenders had their eyes injured by flying corks and pieces of glass from bottles which broke when the gases in them were suddenly released. Many farmers and farm laborers have suffered loss of eyes while working on farm machinery. I know of a number of cases where these men have received severe eye injuries from barbed wire; from staples flying back while removing wire from fence posts; from blades of corn; beards of wheat, thorns and weed stubs; and from splinters, while engaged in chopping wood, entering the eye.

I have handled over 1,000 pairs of goggles, the lenses of which were completely shattered by flying objects, without injury to the wearer's eyes. I have also collected quite a number of goggles with the lenses completely obscured with hot metal, and while men were burned about the head and face, the eyes were saved from injury.

Workmen like to use "goggle alibis." Some of these objections raised by the men are:

(1) "They hurt my eyes. They give me a headache." Examination by an oculist will determine whether or not there is defective vision. If so, he should be provided with prescribed lenses.

(2) "They 'fog-up' and I can't see through them." Rub both sides of the lenses with a piece of Ivory soap and wipe with a dry cloth. This will prevent fogging for several hours.

(3) "They make me look funny." Better look funny with two eyes, than pathetic with one.

(4) "Goggles are heavy." The fact is they weigh about 1½ ounces, which is very little more than an ordinary pair of glasses. There is no comparison between the weight and the protection they offer. Better suffer temporary inconvenience than permanent loss of vision.

(5) "Why should I wear them? There are men in other departments who never wear goggles." Granted that a man chipping a casting is exposed to a greater hazard than a man at a wood machine, the fact remains that scores of men in wood working plants have lost eyes as a result of being struck by slivers of wood.

None of these objections, of course, are logical and they can all be smoothed out by individual talks and personal interest on the part of the safety man.

While a great deal of difficulty is experienced in persuading men with two eyes to wear goggles, I have yet to learn of a case where a man with one eye objected to protecting his remaining orb. This I feel bears out my contention that goggles are absolutely practicable and can be worn by any one, irrespective of his occupation.

In my opinion there is no such thing as a trivial eye injury, since, in order to see, the vital spot (the pupil of the eye) is exposed and injuries to it are always serious because: (1) The act of seeing depends primarily upon keeping the "window" (the pupil) of the eye clean; (2) the small size of the eyeball renders removal of foreign bodies an intricate and delicate operation; (3) foreign bodies, as you know, are alive with bacteria, as was instanced by a man who lost his sight due to infection from pneumonia germs which entered the eye on a chip of steel; and (4) a foreign body can very easily distort the eye and cause astigmatism and the patient is then in the same state as one looking through a rain-soaked windshield.

As stated before, the management must make the first move in the prevention of industrial eye accidents. Goggles cost money—so do eyes. An eye is worth $3,300 in the state of New York. For this amount 3,300 pairs of goggles can be obtained.

We have expended about $75,000 for eye protection. Of this amount, $25,000 was spent for special goggles, that is, prescribed lenses for workmen with defective vision. No sane person will question this expenditure for it prevents loss of sight and saves money; it means better work and more of it; it inspires men with confidence, since they can go about their duties without fear of flying slivers of steel, hot metal, wood, etc.; it means increased production in the case of special goggles, to say nothing of the protection afforded the man who is industrially blind, that is, with vision up to 1/10 of normal in either eye.

Artificial limbs made today are almost life-like. In the United States 40,000 glass eyes are imported each year. They are works of art and sometimes hard to distinguish from the real thing, but unfortunately the wearer cannot see through them.

During the past twelve years I have tried every conceivable method known to human ingenuity to get men to wear goggles. I have used spectacular bulletins, horrible examples, pleading and threatening. I have promulgated rules and regulations which are useless unless they are enforced. In fact, I have used everything along persuasive and educational lines, with very small results and often none at all. It is my firm conviction that the goal for which we are striving will never be attained until a mandatory ruling is issued to the effect that every employee in the shop must wear goggles while on duty. This rule is enforced in the shops of the Pullman Company and is the reason why goggles are worn universally.

Discussion

Dr. H. P. Davidson (Oculist, Pullman Car Works, Pullman, Illinois): After I had been with the Pullman Company two years as part-time eye physician, I went over my records to see the percentage of normal vision at the Car Works. I took the first 4,000 cases that I had seen. Of course, I didn't go over the same record twice. When the man came back two or three times, he was considered just one of the 4,000 individuals. The only thing that we tried to find out was the vision that we had in examining the first 4,000 men.

Mr. Guilbert has very kindly made a chart showing the number of men. (See Chart on page 53.) I will read off the percentages of normal vision that we found in our plant at the Car Works. This 1,139 normal vision is 28.48 per cent of normal vision. The next one, 1,151, is 28.77 per cent. These 1,151 men have 92 per cent of normal vision. This percentage is based on a joint table of the Chicago Ophthalmological Society and the state of Wisconsin table of compensation for loss of vision. This is not an entirely satisfactory table of compensation of loss of vision, but it is the one that Illinois is now following, so the percentages are taken on that basis:

298	men	or	7.45%	had	85%	vision.
246	"	"	6.15%	"	79%	"
229	"	"	5.73%	"	66%	"
190	"	"	4.75%	"	35%	"
696	"	"	17.40%	"	5%	"
51	"	"	1.27%	"	only one eye.	

All of these visions are taken without glasses, and a number of the 17.4 per cent are men who are far and near sighted and presbyopic, whose vision improves with glasses.

If there are any oculists in the audience they know, of course, this represents 20/20 vision. The 92.0 per cent would represent 20/25 and 20/30. The 85.0 per cent would represent 20/40; 79.0 per cent would represent 20/50; the 66.0 per cent would represent 20/70; the 35.0 per cent would represent 20/100; and 5.0 per cent would represent 20/200 vision. Of course, the 51 one-eyed men that we found in the 4,000 speak for themselves.

When you consider that there are only 28 per cent of normal vision in an industrial plant, you can see how important it is to put special goggles on a lot of your men or you won't get maximum work out of them.

I will admit, however, that I am dealing with many people who may be letter ignorant. I mean by that, men who probably can see all right but cannot read the chart. You must remember that I have probably ten or twelve languages to translate, I have a lot of people who can't read a chart, so I have to use what we oculists call the illiterate chart. That is a little "E" chart which probably all of you know. We have an "E" chart of different sizes on the wall. We give this to the patient, we hold it up, and the patient tells us which way the "E" is pointing.

If we consider that 20/30 is normal vision, since we have letter ignorant individuals in the plant, they would increase this normal number by 400, which would increase our percentage ten per cent, which would make our normal vision in the plant about 38 per cent.

MR. CARRIS: Mr. Chairman, I am very much interested in what Dr. Davidson has said about this chart. You know that the National Committee for the Prevention of Blindness is always combating over-statements. Normal vision is, after all, working vision —efficient vision. The morning newspaper, I noticed, came out saying that this Conference says that there is danger of our becoming a blind nation. One reason for such statements is that the people who are interested in making a profit from the sale of glasses are constantly using publicity which tries to say that sixty, seventy, or even more out of 100 people should be wearing glasses. Dr. Davidson, may I say again that that 92.0 per cent means that the person with 20/30 vision has 92.0 per cent of effective vision.

DR. DAVIDSON: That is what we pay for in compensation. If an individual had 20/30 vision after an injury, when we went before the Illinois Industrial Board we would have to pay the difference between 92 and 100.

MR. CARRIS: Isn't that based on the Chicago Ophthalmological Society's table which says that 20/30 vision or sight means somewhere between 90.0 and 95.0 per cent effective vision?

DR. DAVIDSON: Yes, it is based on that.

DR. B. FRANKLIN ROYER (Medical Director, National Committee for the Prevention of Blindness, New York): I am going to ask Dr. Davidson a question. Of the percentage of those who have 20/30 or lower vision, how many are presbyopic?

DR. DAVIDSON: I don't know—1,141 men could be improved by glasses.

MR. CARRIS: We believe that industrial physicians who are examining the eyes of adults could get a lesson from the exhibit we have in the use of the illiterate chart. No matter what the language is, in following the technique fairly good tests of vision can be made.

DR. ROYER: I am going to correct Mr. Carris, Dr. Davidson, and the ophthalmologists present. I rebel at the use of the term "illiterate." Objective test chart is much better. I do not agree with the suggestion that Dr. Davidson gave as to the best method of using that chart. As Mr. Carris has told you, you will see a better demonstration across the way. Many persons when they began using that so-called "E" chart felt that they had to put an "E" in the hands of the child. That meant they didn't know child psychology, they didn't know that the child in the arrangement of things is fixing and concentrating on two points at the same time, and he can't do that very well. They forget that the child has hands and knows how to use them. As a matter of fact, I believe it is the best chart for all ages and probably for the routine testing of indus-

trial plants and for the routine testing in schools. The entire state of Massachusetts has adopted that as the chart for testing.

CHAIRMAN GUILBERT: The next speaker's subject is "The Effects of Invisible Radiant Energy on the Eye from the Medical and Research Standpoints." The speaker is Dr. Charles Sheard, Section on Physics and Biophysical Research, Mayo Clinic, Rochester, Minnesota.

The Effects of Invisible Radiant Energy on the Eye From the Medical and Research Standpoints

CHARLES SHEARD, PH.D.

Section on Physics and Biophysical Research, Mayo Clinic and The Mayo Foundation, Rochester, Minnesota

When the invitation extended by your officers to present a paper before this organization was accepted, I was not certain that I could be with you because of an appointment to be kept elsewhere at the time of these meetings. I therefore wrote saying that I would prepare the paper and asked Mr. Carris to assume responsibility for its presentation in case of my absence. Since I am here, however, and since the essay has been prepared, I shall ask your indulgence if I read rather extensively from the manuscript, for this may save time and give greater continuity of thought than a purely extemporaneous delivery.

In general, I shall not treat the subject from the standpoint of a physicist, which is perchance that which you would expect. The word "physicist" rather indicates to most minds that the speaker may be full of technicalities and be a bag of dry bones to those unacquainted, in large measure, with this branch of science. While I am willing to admit the accusation, I still hope that the presentation and subject matter will not be wearisome.

It is hoped that this paper will help to clear up some of the confusion that exists in the minds of both scientific and lay people with reference to the value or usefulness of ultraviolet light, on the one hand, and its deleterious effects, on the other.

These are days when we hear and read much about the advantages of being "sunkist" and the necessity of including in the food we take into our bodies, to supply the needs of the inner man, those invisible but nevertheless vital, virile accessory food factors known as vitamins. While our foods may be thought of as combinations of atoms and molecules of carbon, oxygen, hydrogen and like elements, we must remember also that they have stored up within themselves that intangible something which we call the energy of the sunlight, and that our foods are literally canned or bottled

sunshine. The chlorophyll of the plant works under the light as the activating agent or transcendental medium whereby the carbon dioxide and the water are synthesized into starches and sugars. Carbon dioxide plus water means nothing but a physical solution at best; carbon dioxide plus water plus sunlight means life. The sunlight is the agent of union: it literally brings the lifeless to life. According to our modern electronic theories, we may conceive of this as being due to the fact that energy contained in certain wavelengths of light ionizes the atoms in complex chemical substances and gives them new activities and powers. As will appear later on in this paper, the ionizing action of radiant energy, particularly the ultraviolet portions, plays an important rôle in certain theories

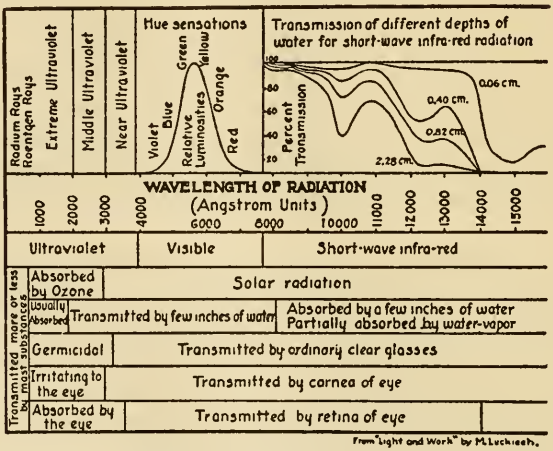


Fig. 1.—Approximate ranges in wavelengths of various radiations and their transmission by various mediums, such as the eye (after Luckiesh).

of the cause of cataract. After all is said and done, an ionized atom or molecule of calcium, phosphorus, or what not, is not the same entity as a non-ionized molecule or atom, for the ionized atom has, figuratively speaking, its arms wide open to grab, while the non-ionized atom has its arms folded and is, so to speak, at rest.

The Beneficial Systemic Effects of Ultraviolet Rays.—It is true that most plants and animals are as dependent for normal growth and development on the short wavelengths of sunlight, known as the ultraviolet rays, as they are on heat energy which, in large measures, lies in the infra-red radiations of sunlight. Solar radiation is classified ordinarily into heat, visible and ultraviolet rays, de-

pending on the wavelength of the radiation and its effect upon the receiving medium. Today, the ultraviolet portions of the energy radiated from bare carbon arcs and quartz-mercury vapor lamps (which far exceed sunlight in their gamut of radiations) are divided into two parts, the so-called biologic and abiotic.

The biologic ultraviolet rays, which are stimulating in character, constitute the so-called near-ultraviolet portion and extend from the limit of the visible violet rays (about 400 millimicrons) to a little below that of the limit of sunlight (about 290 millimicrons). For example, the vital "health rays" of sunshine lie at the extreme ultraviolet end of solar radiation (320 to 290 millimicrons). These are the rays chiefly instrumental in causing us to tan; these are the rays in sunshine which supply us with the antirachitic vitamin D and which are so vital to normal development of bone tissue as well as being fundamental to growth and nutrition in general. Again, the shorter ultraviolet rays, obtained from sources of artificial light, such as carbon and mercury arcs, are the radiations which have been found to be capable of endowing a great variety of foods with antirachitic properties.

Scientists and laymen are beginning to realize consciously that radiant energy is one of the most important things in the world. It is not known why light stimulates and heat depresses; why some people tan and others do not; why those who pigment most easily get the greatest benefit out of sunlight treatments as well as from artificial light sources rich in ultraviolet; why foods that contain no vitamins (such as vitamin D, which is so essential to the development of bone) acquire considerable quantities of these essential substances under exposure to ultraviolet light; why tuberculosis affects cattle in proportion to the time they live under cover and away from sunshine; why irradiating the cow or even the milk gives a food that is highly effective in preventing and curing rickets and other metabolic disturbances; why the calcium and phosphorus content of milk from pasture-fed cows is greater than from cows living in the shade and fed on dry fodder; why the rays of the sun materially increase the iron content of the blood and help us to keep from becoming anemic; why the thyroid gland is richer in its secretion of iodine in the summer. While we do not know the whys and wherefores, we do know that ultraviolet rays are absorbed in the skin and that this absorption of ionizing energy produces chemical changes in the cholesterol of the skin, producing an active substance known as ergosterol, which is carried into the blood stream and is so potent in its systemic effects.

The Detrimental Effects of Ultraviolet Rays on the Eye.—I have taken occasion to indulge in the preceding brief and somewhat popularly stated account of the beneficial effects of ultraviolet light on growth and metabolism for the reason that there is apparently much confusion in the minds of many as to why, then, such rays should be deleterious to the eye. As one of my former colleagues said to me: "One thing which is continually coming up and which always makes me smile is that every one asks why, if the ultraviolet is such an excellent germicide and is so beneficial to certain diseases of nutritional dysfunction, it is not good for the eye. I ask them, in turn, if they want to kill the eye along with the bugs." This answer, in turn, may make you smile and yet it is an excellent question in answer to another fruitful query. For the ultraviolet rays are excellent germicides and may be used advantageously, under proper medical supervision and under proper manipulation and direction of these rays, in the treatment of various lesions of the external eye and eyelids. Today we know that the invisible ultraviolet rays of sunshine are essential to the production of vitamins in plant life and that plants are the only known source of several of the vitamins. Insofar as the eye is concerned, these radiations are of no use in vision, neither do they assist in ocular nutrition, but they may act as germicidal agents to aid in the prevention of untoward conditions in the external eye and eyelids. Therefore, while ultraviolet irradiation does much for weak-legged chickens and rickety children by reason of the fact that it constitutes, either directly or indirectly, the only source of vitamin D, and while it is of value therapeutically or prophylactically in many other conditions of bodily deficiency, or malnutrition, it does not follow that it has a beneficial effect on all tissues and organs of the body.

The ultraviolet radiation given gratis by Old Doc Sol, or as derived from our modern carbon lamps and quartz-mercury arcs as administered and taken under the care of competent physicians, probably accomplishes its work by reason of the fact that it is absorbed by the skin and the fine network of blood capillaries that feed it and are enmeshed in it. The tan which is produced is but an evidence of the chemical and physical reactions which are taking place. But in tissues which are bloodless, such as simple protoplasm, ultraviolet radiations (especially the shorter rays from the artificial sources) produce undesirable and often deleterious effects. The cornea of the eye is normally as clear as glass; it is not provided with blood-vessels. The crystalline lens of the eye is normally a transparent, colorless body and looks for all the world like a camera

lens. These conditions must exist in order that light may reach the retina and cause us to see. Nay, more than that: that we may see the light from a candle over a mile away and read a newspaper in the light of the full moon. So such tissues as the skin, on the one hand, and the cornea, crystalline lens and humors of the eye, on the other hand, are different in structure and in function. What is meat to one is poison to the other. And again, the retina may be thought of as a layer of hypersensitive skin; so, if ultraviolet light should reach the retina erythema would be produced with the same train of symptoms as we get when we overdose ourselves with the summer's sunshine.

Intensity of Ultraviolet Light.—Furthermore, not only do we need to consider the dissimilarity of the skin, with its cholesterol and its mesh-work of fine capillaries filled with blood, and the eye, with its transparent media and the absence of blood supply in the cornea and crystalline lens, but we must also consider the intensity and distribution of energy in sunlight and in the radiations given out by various carbon and mercury arcs. Noon sunlight on a clear summer's day consists of about 80 per cent of infra-red or heat, 15 per cent visible, and 5 per cent ultraviolet radiation. The ordinary incandescent lamp, with its glass bulb, has approximately 90 per cent infra-red, 9 or 10 per cent of visible, and but a small fraction of ultraviolet radiation, and that, too, rarely below 320 millimicrons in wavelength, due to the absorption by the glass bulb. Scientific tests have been made on the intensity of the ultraviolet rays given out by a new quartz-mercury arc operating at, say, 50 volts and consuming 10 amperes with that of the sun at 35°, the mean altitude, and they show: At 100 cm. distance, 3.9 times sun's strength; at 70 cm. distance, 7.1 times sun's strength; and at 50 cm. distance, 13.3 times sun's strength.

Therefore, with an arc of relatively low energy consumption, (say 300 to 600 watts) an eye looking directly into such a source of light, while working at a distance of two feet, would receive almost fifteen times the direct radiation in a corresponding region from the sun. And in arc welding, in which arcs exist and operate under relatively high wattage, we know that the energies of the wavelengths which are probably particularly potent in causing coagulation of lens protein run to high values.

Again, the amount of either visible or invisible radiation that enters an eye depends on the angle at which this radiation is received. All good things come from above, including solar radiation. Rarely does the eye receive other than diffuse daylight. The bulk

of the time we are looking downward instead of upward, in spite of the admonition to the contrary. The eye receives but little ultraviolet radiation from the sun, for the greens of Mother Nature, which predominate in the summer time when the ultraviolet content of sunlight is at its maximum, reflect but little ultraviolet radiation. And it has been suggested that the farmers of a generation or so ago were more prone to cataract (opacity of the crystalline lens or of its capsule or of both) than they are at present, for the reason that farmers today, when out in the field, tell time by the almost universal Ingersoll, whereas years ago they estimated the time of day by looking right at Old Sol himself. And any one of us can put himself from time to time under conditions of light that may produce irritation of the external eye, aching of the eye and head and a general condition of photophobia (abnormal intolerance of light), by taking a holiday at the watering beaches and receiving, through eyes unprotected with suitable tinted or colored lenses, the direct reflection of light from the water, or again, in the winter time, the glare from vast expanses of snow. The power of reflection of ultraviolet by expanses of water and snow is very high.

I have known some of my associates to experience mild symptoms of ultraviolet burn in the eyes due to reflection of light from the unpolished surfaces of tables receiving the direct radiations from mercury arc lamps which they were using in experimental work. The total distance from the lamp to the table to the eyes approximated four to six feet. Bearing in mind the law of inverse squares, and that the coefficient of reflection of an ordinary unpolished table top is not very high, it is apparent that the intensity of the ultraviolet light entering the eye was relatively low, yet the reception of such energy over a period of several hours produced untoward symptoms. And, furthermore, in experimental work on animals, which may be irradiated a few minutes a day with a quartz-mercury lamp at a distance of a foot or two feet, experience has shown that their eyes must be carefully protected by bandaging; otherwise they quickly acquire opacities of the cornea and sometimes of the crystalline lens.

These statements indicate the necessity for suitable protection of the eyes of those who work near or in the vicinity of sources rich in ultraviolet light. Deleterious reactions may not follow immediately but, being largely cumulative in character, may produce a train of pernicious or incapacitating effects.

One often hears the question: "How far away from an arc may a person work with safety?" No specific answer, I believe, can be

given such a question, for it depends on the energy of the arc, per se, and also on the physical and nutritional status quo of the person involved. The best practice is to hood the arcs as far as possible and to protect adequately the eyes of those working in their vicinity.

Absorption of Radiant Energy by the Ocular Media.—Chemical and physical changes occur only by reason of the absorption of incident energy. It is important, therefore, to know what portions of radiant energy are absorbed by the various media of the eye.

In 1908 Parsons and Baly carried out investigations on the absorption spectra of the cornea, lens and vitreous humor of rabbit eyes. These researches were antedated in some particulars by those of Birch-Hirschfeld, Hallauer, and Schanz and Stockhausen. In a general way Parsons and others have concluded that: (1) the cornea transmits wavelengths to about 300 millimicrons, (2) the crystalline lens transmits to 350 millimicrons, while (3) the vitreous transmits to about 230 millimicrons with a definite absorption band extending from 250 to 280 millimicrons. With reference to the vitreous, it is to be remarked that its principal ingredient is water, and therefore its transmission would be expected to approximate that of water. Hallauer in 1909 spectrophotographically measured the absorptive power of over 100 human lenses. For young lenses most of the rays were absorbed up to about 400 millimicrons (extreme visible violet) but a certain number of rays between 330 and 315 millimicrons were able to pass through. With advancing age, however, transmission usually begins above 400 to 420 millimicrons. Helmholtz records the visual observation of the entire ultraviolet spectrum of sunlight, but we may well doubt the accuracy of this observation. Some fairly recent experimental work carried out by Graham on the transmission of crystalline lenses, and independently by Glancy (who made use of limits of visual observation in the ultraviolet), give the limit of transmission and visibility as about 320 to 310 millimicrons. Mascart, in 1869, with high-powered ultraviolet sources, considered that radiations as short as 313 millimicrons were visible. (See Figure 3, facing page 72.)

All of these investigations show that the crystalline lens absorbs in large part the ultraviolet rays transmitted by the cornea and which lie between 300 and 380 millimicrons roughly. The crystalline lens fluoresces when these rays strike it. Schanz and Stockhausen attributed this fluorescence to the region 350–400 millimicrons. But in this they are doubtless in error, for a fluorescent body always strongly absorbs those rays which induce the fluorescence. Hence this rôle must be allotted to rays transmitted by the

the cornea and lying between 300 and 350 millimicrons. The fluorescence caused by the ultraviolet rays absorbed by the crystalline lens is a source of disturbance in vision and may be eliminated by the use of suitable glass filters such as Crookes A.

In regard to infra-red rays, Aschkinass, in 1895, published results on the absorption of infra-red radiation by the eye and concluded that in transmission of infra-red radiation the eye is almost identical with water. The percentage of water in the corneal composition is 90; there is 92 per cent water in the lens cortex and 84 per cent in the lens center. The total eye has been found by Luckiesh to be equivalent to 2.28 cm. of water. The determinations of the transmission and absorption of the incident infra-red by ocular media as made by Hartridge and Hill in 1917 show that the visible and infra-red radiations from 500 to 1,000 millimicrons (just above the visible red) are absorbed by the iris to about 95 per cent of the incident energy. About four times the amount of energy is absorbed for each unit area of the iris as is absorbed by the lens. The crystalline lens, on the other hand, transmits about 80 per cent of the incident infra-red radiation with wavelengths between 1,200 and 2,400 millimicrons. By reason of the moisture in the atmosphere, however, (since the infra-red transmission of water is the same as that of the eye) much of the longer infra-red radiation from the sun is absorbed before reaching the eye. Hartridge and Hill attribute cataract to the absorption by the iris of radiation from 700 to 1,200 millimicrons.

The General Physiologic Effects of Power Burn and Ultraviolet Burn.—There is a faint perception of ultraviolet light in the eye, not as a distinct light but rather as an uncomfortable indistinct feeling together with some form of dull pain. Repeated or prolonged exposure to ultraviolet light produces severe ocular inflammation. The visual effects of this inflammation are similar to the results experienced when one attempts to read under blue light: only with difficulty, if at all, can one fix on the fovea, so that, without impairment of vision on the remainder of the retina, clear distinction is made impossible and reading becomes difficult or impossible. It seems as if the macula is overirritated and when used, for instance in reading, becomes very rapidly fatigued and the vision begins to blur.

The inflammation of the eye produced by ultraviolet rays appears to be different from that caused by exposure to high-powered radiation of no specific wavelength, such as the energy radiated from a short-circuit of an electric system or an explosion.

The general symptoms of power burn consist of temporary blindness, severe pains in the eyes, redness of eyes and face, and the like, all of which increase in severity for a few hours and then subside. Such burns may occur because of the fact that most artificial light is due to incandescence of substances heated to high temperatures. Radiation from such sources consists of a very small percentage of visible light, the major portion of the energy being in the infra-red.

In the case of ultraviolet burns, the onset of the symptoms is from six to eighteen hours after exposure, with severe deep-seated pains in the eyes. The external inflammation is moderate or absent; vision is not immediately affected, but the inability to focus the eye on any object is noticeable. The pains in the eyes and the headaches yield rather slowly. For weeks and even months attempts at close work, such as reading, lead to blurring of the vision; the letters of printed words appear to run around, and the eye is unable to hold them fixed, while headaches and severe pain in the eyes follow such attempts. In severe cases these effects may last for months and even years. Very often, if reading is continued for any length of time or under poor illumination, the blurring of vision and the headache return years after the initial exposures. Of course, the more common ultraviolet burns are not so severe and recovery occurs in a few weeks' time.

Cataracts.—The extent of our knowledge of the influence of radiant energy of specific kinds and amounts on the human eye and hence, indirectly, on the comfort and efficiency of human vision is as yet very limited. We have, for example, two rather divergent and apparently conflicting ideas as to the influence of radiant energy in the production of cataract. Both of these views may be found to be compatible, however, for either the infra-red or the ultraviolet may superinduce cataract under certain physiologic conditions. (See Figure 2 on page 70.)

Some years ago, Burge carried out a series of experiments on cataracts produced in the eyes of fish living in water containing small percentages of calcium chloride or sodium silicate. It is well known that cataracts are extremely common in the natives of India and, in general, in people living in the tropics. Chemical analyses show the presence of large quantities of silicates in the cataractous lenses of the people of India, but no appreciable silicates are found in those from the United States. Silicates may be accounted for in part by the fact that certain sects or classes in India eat siliceous earths as part of their diet, while the prevalence of cataract may be accounted for by the large amount of ultraviolet radiation present

in tropical sunshine and the silicates present in the eye media. Burge has, therefore, endeavored to correlate the interaction of ultraviolet light, the proteins of the lens and chemical salts in accounting for cataract. His experiments show quite conclusively that there is added liability to cataractous conditions when certain salts are in excess in the nutritive sources of the lens. (See Figures 4 and 5, facing page 72.)

The short wavelengths of the spectrum produce a molecular rearrangement in the protoplasm of the cells of the crystalline lens, so that inorganic salts, such as are found to be greatly increased in cataractous lenses in man, can combine with the protoplasm to precipitate it, and hence produce an opacity.

That ultraviolet radiations kill living cells by coagulating their protein may be seen by direct observation through the microscope during an intense exposure of unicellular organisms, such as paramœcia.

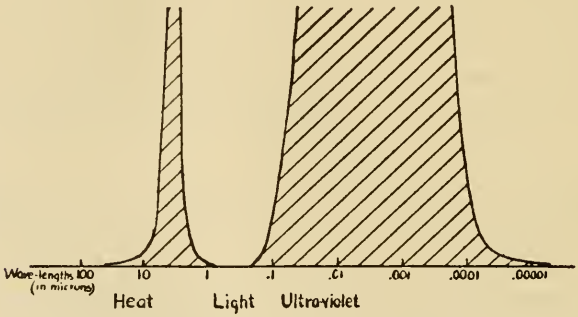


Fig. 2.—Regions in the spectrum where protoplasm absorbs (after Bovie).

The effective region of the spectrum in changing the living material of the cell or protoplasm lies between 254 millimicrons and 302 millimicrons. The most effective region is around 254 millimicrons for the small quartz-mercury burner used, and around 302 millimicrons for the large burner.

An opacity of the lens, or cataract, can be produced in fish living in solutions of those salts found to be greatly increased in cataractous lenses in man by exposing the eye of the fish to radiation from a quartz-mercury vapor burner. This cannot be done by exposing the eyes of fish living in tap water, which contains only very small quantities of these salts. (See Figure 6, facing page 73.)

Abnormal quantities of the salts of calcium and sodium silicate in the cells of the eyelid and of the cornea increase the effectiveness of ultraviolet radiation in producing trouble in these structures.

Abnormal quantities of calcium salts in the skin presumably increase the effectiveness of the short wavelengths in sunlight in producing sunburn.

In looking for the cause of cataract it would seem that at least two factors should be considered: The one, a modification of the protein of the lens by ultraviolet radiation, and the other, the presence of certain inorganic salts by which the modified protein can be precipitated. According to this hypothesis, the prevalence of cataract among people living in the tropics could be accounted for by the increase in the radiant energy factor modifying the lens protein so that an excess of salts, such as silicates in case of people in India, would combine with the protein to precipitate it and produce opacity of the lens, or cataract. The prevalence of cataract among glass-blowers is also accounted for by the excess of the radiant energy factor, the assumption being that glass-blowers who develop cataract have a more or less disturbed condition of nutrition, expressing itself as an increase in sugar (as the result of diabetes), calcium salts or in some other substance, which can combine with the lens protein made sensitive by the action of the short wavelengths. (See Figure 7, facing page 73.)

The chief conclusions of Verhoeff and Bell relative to cataract formation and other effects of irradiation on the eye are:

1. Abiotic (lethal) action for living tissues is confined to wavelengths shorter than 305 millimicrons. The lens protects the retina of the normal eye completely even from the small percentage of abiotic rays which can penetrate the cornea and vitreous humor. To injure the cornea, iris and lens by the thermic effects of radiation requires extreme concentration of energy. No concentration of radiation on the retina from any artificial illuminant is sufficient to produce injury thereto.

2. Snow-blindness may occur after long exposures due to ultraviolet light. Glass-blower's cataract is not due to ultraviolet rays but probably to the overheating of the eye as a whole with consequent disturbance in the nutrition of the lens.

3. Commercial illuminants are entirely free of danger under the ordinary conditions of their use. The glass globes are sufficient to prevent any deleterious effects due to ultraviolet.

4. Suitable glasses protect because they reduce the total amount of light to a point where it ceases to be psychologically disagreeable or to be inconveniently dazzling.

There are also the researches of Hartridge and Hill, of England, in which the seat of the irritation leading to cataractous conditions

may be attributed in many cases to the infra-red or the longer wavelengths of radiant energy. Such radiations are freely transmitted by the cornea and are absorbed in large part by the iris which lies close to the lens. They may thus cause nutritional changes in the lens by virtue of the abnormal stimulus to the processes controlling the secretion of the humor. Such a view seems entirely reasonable and highly probable. It may be accepted, therefore, as definitely proved, that radiant energy, either by virtue of its kind or its quantity, may aid in or be the primary cause of cataractous formations when certain physiologic conditions are present.

Hartridge and Hill believe that heat radiation is probably absorbed slightly by the pigment in the substance of the iris, by far the greater amount of energy passing through and being absorbed finally by the pigment on its posterior surface. In the case of blue-eyed persons the pigment in the stroma of the iris is absent and the posterior pigmentary layer is alone effective in absorbing radiant energy. This means that the absorbent layer comes in intimate contact not only with the posterior chamber of the eye but also with the processes of the ciliary body themselves. A rise in the temperature of the pigmentary layer due to the absorption of heat must necessarily cause at the same time a rise of temperature by conduction to surrounding structures; in this the glandular elements of the ciliary body take part, and there is excessive secretion of aqueous humor which nourishes the lens.

There are several remarkable features in the occurrence of glass-blower's cataract. The very long period taken for the condition to develop does not at all suggest any pathologic change of an inflammatory character, neither has any obvious change in any other structure of the eye apart from the lens been described. Thus the pupil is normal in size and reaction to light, which would not be the case if it had been the seat of any chronic inflammatory change. It would seem more likely, therefore, that the change in nutrition of the lens is one brought about by some physiologic alteration in the secretory mechanism of the aqueous rather than by a pathologic change. One needs only to postulate a secretion of aqueous when heat falls on the iris to obtain what appears to be a plausible hypothesis of the formation of the cataract. Normally, aqueous is secreted in small amounts all the time; when heat falls on the iris a larger secretion occurs. This stimulus, occurring regularly over long periods of time, ultimately causes the secretory mechanism to be more and more dependent on the external stimulus. The secretion becomes periodic in character so that the lens, instead of re-

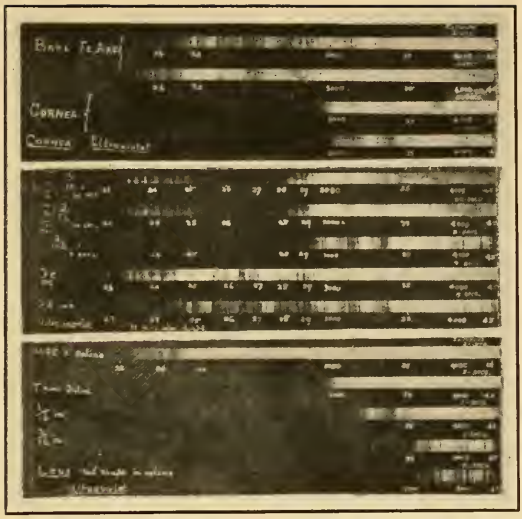


Fig. 3.—Spectrograms showing the transmissions of visible and ultraviolet light by the cornea, vitreous, and crystalline lens of the eye (after Parsons).

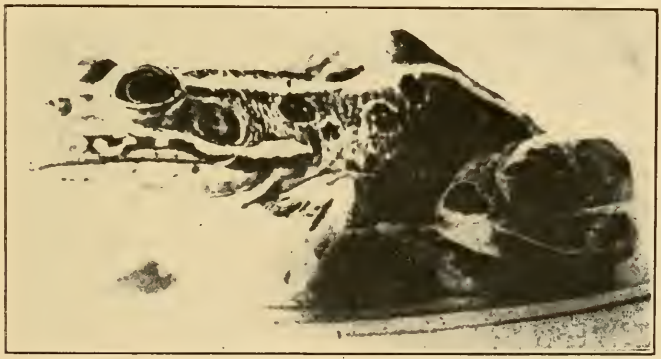


Fig. 4.—Frog living in tap water and exposed to ultraviolet radiation for five hours. No demonstrable effects (after Burge).

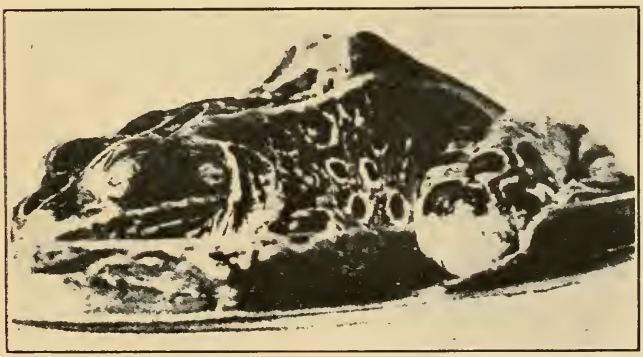


Fig. 5.—Frog living in 0.2 per cent solution of sodium silicate and exposed to ultraviolet radiation for five hours. Demonstrable effects on the eye (after Burge).

Fig. 6.—Fish 1, living in tap water exposed to ultraviolet light for twelve hours. Fish 2, living in 0.1 per cent sodium silicate and exposed to ultraviolet radiation for twelve hours. Fish 3, living in 0.1 per cent sodium silicate and exposed to ultraviolet radiation for twenty-four hours. Fish 3 shows definite opacity in the eye (after Burge).

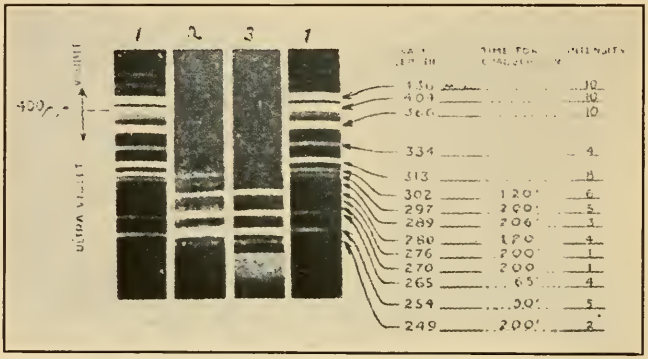


Fig. 7.—Spectrograms of quartz-mercury arc. 1, Made on a photographic plate. 2, Made on lens protein extracted by 0.1 per cent calcium chloride. 3, Made on a thin layer of lens substance immersed in 0.1 per cent calcium chloride solution after exposure to ultraviolet radiation (after Burge).

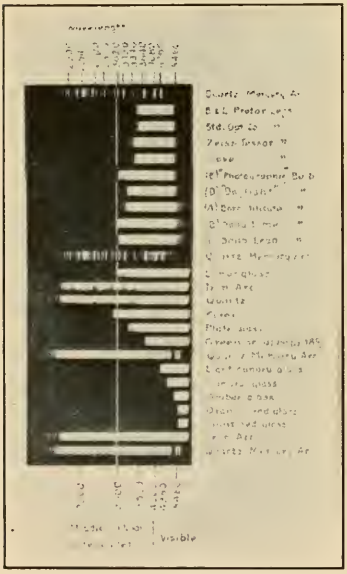


Fig. 8.—Spectrograms obtained with a quartz spectrograph showing the transmission of ultraviolet and visible rays by various substances (after Luckiesh).

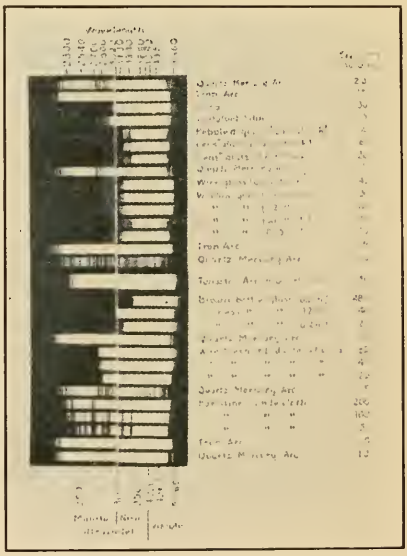


Fig. 9.—Spectrograms obtained with a quartz spectrograph showing the transmission of ultraviolet and visible rays by various substances (after Luckiesh).

ceiving nourishment continuously, gets it only at intervals, with the result that the least well-nourished part of the eye suffers and cataract develops.

Prevalence of Cataract in Industrial Workers.—Considerable literature has been contributed by European writers in which it is shown that years of service in certain trades (such as tin-plate milling, tending iron furnaces, glass-blowing, and the like) cause lenticular opacities in high percentages of such workmen. In America, on the other hand, while the investigations on this subject are few and reports are meager in statistics, there is apparently no high incidence of cataract as the result of industrial occupations. This difference in statistical conclusions may be due to: (1) Shorter tenure of job in American industry; (2) differences in the physical condition and nutritional status of workmen; and (3) the greater use of protective agencies, such as goggles and hoods.

Healy, writing in the *British Journal of Ophthalmology* (1921) on the prevalence of lenticular opacities in the eyes of tin-plate millmen, says that about 40 per cent of men aged thirty-five years or more had lenticular opacities of various types. Some 424 men were examined in addition to 96 cases in private practice. Of the 424 men examined, 70 were under the age of thirty-five years and only one case of lenticular opacity was found. In later visits he examined only those aged thirty-five or more. Out of 354 aged thirty-five years or more, 144 were found to have lenticular opacities. Healy's impression is that an opacity does not develop until the man has been at work in a tin mill for at least fifteen years.

The age distribution is as follows:

Age	35–40	41–45	46–50	51–55	56–60	60 and more
Men examined	74	67	65	61	53	29
Cases of lenticular opacity	13	12	22	38	34	20
Percentage	17.5	18	34	62	64	69

Wirth, in a paper appearing in the *Journal* of the American Medical Association (1922), reports that he examined 158 glass-blowers. In the group aged between forty and sixty years he found that 32.4 per cent, and in the group of those more than 60 years approximately 74 per cent, showed signs of cataract. These figures are somewhat higher than those reported by other investigators and may be due to the fact that the examinations were made with dilated pupils.

These data, and others of a similar character which might be quoted, indicate that there is a definite correlation between excessive radiant energy (either ultraviolet or infra-red) and lenticular

opacities in certain industrial occupations, and that the likelihood of the development of such opacities is progressively greater with increasing years of service.

Protection Against Invisible Radiant Energy.—While recognizing that agreement has not yet been reached as to the exact factors which enter into the production of glass-blower's cataract and the like, the following protective measures may be suggested: (1) The smallest possible exposed source of radiant energy; (2) goggles protecting simultaneously against infra-red and ultraviolet rays; (3) frequent interruption of work, in the sense that the workman should be placed on other work in the factory and at the same pay; (4) shorter or alternate working shifts; and (5) the collection of data on the incidence of lenticular opacities in those engaged in occupations where furnaces are operated at high temperatures and arcs are used under considerable input of energy.

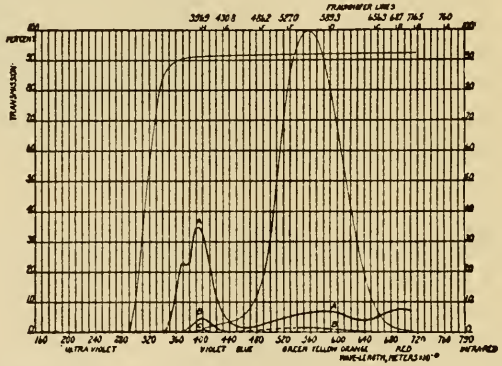


Fig. 10.—Spectrophotometric determinations of light transmission of various protective glasses. A, Welders' smoke, dark; B, Welders', light; C, Special welders', dark. (From Bulletin 119, publications of Bureau of Standards.)

From the prophylactic standpoint, I believe that all who are conversant with the facts are in agreement that there should be adequate protection against ultraviolet light, a reduction in the visual energy and the elimination of much if not all of the infra-red radiation. For this protection, in varying degree dependent on the character of the work, the input of energy of the furnace or arc and the percentage distribution of the radiant energy into ultraviolet, visible and infra-red portions, there are a variety of high-grade protective glasses set in goggles or in hoods to be slipped over the head. We need not enter into details on this matter for bulletins have been published by the Bureau of Standards (Numbers 93 and 119) and these give full data on a great number of protective glasses and spectral filters. (See Figures 8 and 9, facing page 73; also Figure 10.)

In conclusion, it is obvious that the preservation of the eyesight of the workman is of the highest importance to both employer and employee. To say the least, certain trades and occupations inherently carry hazards to visual efficiency insofar as both the quality and the quantity of radiant energy are concerned. The solutions to many of these problems are in their incipient stages. It would seem logical to presume that closer co-operation of physician, physicist, and engineer might lead to further light on this subject.

Discussion

MR. MEYER: Is this type of cataract different from the senile cataract?

DR. SHEARD: There are many classifications of cataract, such as senile, congenital and juvenile, and of location, such as anterior polar, posterior polar, lamellar, and so forth. Perhaps Dr. Jackson may have something to say in answer to this question, since this falls very properly within the scope of ophthalmology. In the last analysis, however, cataract is cataract, by which we mean any opacity of the lens or of its capsule or of both. It is caused primarily by the failure of proper nutrition to these bodies. The experiments of the various investigators which we have cited show that such opacities can be produced by various types of radiant energy.

Healy found that about one-third of the lenticular opacities in the eyes of tin-plate millmen showed the typical wedge-shaped striated cortical opacity below, with its apex upward and growing into the posterior cortex. Dense round posterior cortical opacity, similar to that supposed to be typical of bottle-maker's cataract, occurred in about ten per cent of the cases. These two types were found associated together in about eight per cent of the cases examined. In over one hundred cases in which record was made as to the "hand forward on the tongs," the eye first affected corresponded to the hand forward. Therefore it appears that two types of opacity predominate: (1) round, dense posterior cortical and (2) striated cortical wedge-shaped opacity, apex upward, growing in the lower cortex.

MR. RUDDY (Pullman Company, Chicago): Is the absorption of energy by the eye communicated to any other part of the system?

DR. SHEARD: Any radiant energy received by the retina and choroid would be absorbed by their blood-vessels, and therefore would cause marked local effects (such as dilatation of the blood capillaries) and minor systemic effects. Energy absorbed by the cornea or crystalline lens would probably cause only local reactions and effects.

In all of this discussion nothing has been said of the effects of radiant energy on the nervous system. There are those who believe that radiant energy produces reactions, both locally and system-

ically, particularly in the case of the peripheral nervous system of the body under general exposure to such energy. The conjunctiva is supplied with both blood-vessels and nerves; the cornea is without blood supply but is richly endowed with nerves derived from the ciliary nerves. There is evidence to support the contention that nerve reactions do occur under irradiation. The subject is too complicated, however, to warrant more than a passing reference.

DR. ROYER: I can't make any scientific contribution, but I was interested to recall a conversation with one of the largest optical manufacturing concerns in the United States while in conference with their officers on another matter. They took a great deal of interest in showing some new glass which they had prepared and were considering marketing or putting in goggles, glass that would exclude the short wave lengths of the ultraviolet and would exclude this infra-red or the heat waves. They thought it would be a mighty good advertising medium if they could just put their fingers on statistics that would prove the point that cataract was very much more prevalent in persons exposed to these high temperatures and fierce heats, like the molten glass, and so forth. When they came to check up the incidence of cataract in that age group as with the public as a whole, they found it was practically the same and didn't help a bit for sales purposes. The statistics in that instance did not give them the point they were looking for, so they could not use it.

CHAIRMAN GUILBERT: The speaker's reference to the good old days and the bad old days, as we ought to call them, brings back several sad recollections, among which were bartenders with one eye destroyed by corks and bottles that broke due to the contents. I suppose everybody here has heard of Dr. Jackson and I would appreciate it if he would contribute something to the industrial side of this question.

DR. EDWARD JACKSON: There are one or two points that perhaps have not been fully covered in Dr. Sheard's presentation of the subject.

The fact is, we don't know the processes by which cataract is developed. We are getting around the edges of the question in different directions. Dr. Sheard emphasized energy entering the eye with light, perhaps as light. Another is nutrition especially influenced by certain salts. Investigations seem to show that calcium has as important influence. Recently it has been discovered that the parathyroid glands control calcium nutrition. Disturbances of the parathyroid glands have been noticed associated with tetany and with cataract, which goes with tetany. Our circle of knowledge has not yet narrowed sufficiently to make anything of industrial value except with reference to some kinds of cataract. Glass-blower's cataract has been studied from many points of view and experimentally to some extent, and it probably is due to heat. Whether it is heat that reaches the lens as heat, or whether it is the effect of heat on the nutrition of the eye in general that does it, apparently the

exposure of the glass worker is to heat rather than to excessive light. The change of radiant energy that goes on in the eye and the skin and other substances is in general a degradation of the rapidity of vibration—the rapid vibrations of ultraviolet light to the greenish light that is produced in fluorescence, or from the light waves that enter the iris, or choroid, into heat. A particular substance has the power of taking a certain wavelength of energy and changing it in the direction of longer wavelengths, less frequent vibration.

There is a sort of circle of facts that we know have some bearing on cataract and on other changes in the eye, but they have not yet been narrowed down small enough to be effective in catching the particular relations that would be of value in industrial work.

CHAIRMAN GUILBERT: Thank you, Doctor, I am sure that everybody appreciates your remarks.

Our next speaker will talk on "The Effect and Control of Injurious Invisible Light Rays in Industrial Occupations from the Practical Shop Point of View."

The Effect and Control of Injurious Invisible Light Rays in Industrial Occupations from the Practical Shop Point of View

J. I. Banash
Chicago, Illinois

It is extremely questionable whether I can add anything more practical than what has been said. Harry Guilbert is one of the most practical men I know of. You heard his talk. Dr. Sheard's paper can be described only by one word in my limited vocabulary, and that is: "Masterful." He got down to the level where the man in the shop, or at least the man in control of the shop, could understand what he is talking about. I am going to ask for a copy of that paper just as soon as possible, because I have an immediate use for it.

Since your Secretary invited me to discuss some of the practical features, and not having all of this knowledge of my own, I have taken the opportunity to question all those whom I thought might have some data of value in the particular industry with which I am connected. I happen to be consulting engineer to the International Acetylene Association, and of course, with the tremendous growth of gas welding operations, if there were exposure we would have it.

Maybe I am practical and possibly somewhat theoretical when Mr. Guilbert invites me to his plant. He considers me theoretical. At present I am supposed to be extremely practical. About the invisible rays, like the definition of a Scotchman,—a close friend,—they are always with you.

In the gas welding industry we do not seem to have the difficulty in making our men wear goggles that they do in certain mechanical operations in shops. The reason the employees of the Pullman Company, for example, can be made to wear goggles almost universally is because the man directing them actually feels the subject; you can tell that from the way he talks; his men have to feel it if they have been in contact with him long enough.

With us, perhaps, it is the historical development (and you will forgive me for sticking to the industry with which I am most familiar) of flame welding as developed from blacksmith operations which have been with us so long. I know of no blacksmith who ever wore goggles. He was exposed to heat rays. He was exposed to heat

rays that he did not see. Presumably, if our statistics could segregate the cataracts in blacksmiths when that trade was so prevalent, we might have found more than in the ordinary population; we do not know.

At the present time the gas welding industry is governed in its selection of protection against invisible rays by the recommendations of the National Safety Council as published in "Safe Practices, Twenty-three." They are very brief, and they have sufficed, as far as we know. Quoting from that: "Properly colored lenses fitted in goggles will furnish complete protection to the eyes." Then it goes on with a little descriptive matter.

To find out whether our many years of following that particular suggestion, which by the way was followed many years before it was published in that particular pamphlet, I have asked people connected with the industry in one way or another since its inception, as far as this country is concerned, along about 1908, and from four or five of the deans of the industry, as you might say, and I have failed to find a single record of eye injury or of compensation paid for injury by invisible rays. Possibly our record is so good because it is so easy to get from the standard goggle manufacturers sufficient protection for our purpose.

You may think of welding and cutting of metals as a spectacular operation when it comes in large operations, but there are thousands of people working with very small blow-pipes,—jewelers, dentists,—manufacturing processes on light weight metal, and we find that we do not even need the complete protection of goggles there, but we do recommend and we do succeed in getting those people to use spectacles.

As for any record that I have been able to dig up in our industry, there is none. I was very glad to hear the gentleman at my left state that when they thought that perhaps among the welders there was a greater amount of cataract than among the ordinary people, they did not find it so.

In Dr. Sheard's paper, I noted just one little point that I am going to ask him to alter, because I am going to use that paper right away. In the middle of the paper he said welding and he meant electric arc welding. We would feel very badly if he meant us, and we would take immediate steps to do anything which could be done to alter the case. We are rather proud of our record, and while I am on my feet I want to give you a chemical prediction, made at our last convention by one of the great chemists of this country, which may, perhaps, offset the loss of the ultraviolet from the sun a few million

years from now, and that is that acetylene is the only known link between the inorganic and the organic chemical world. If we get short of food, if we don't have enough ultraviolet to stimulate our plant growth, we probably will be able to take lime and coke and fuse them in the furnace and make calcium carbide from which we will get acetylene and maybe we will synthesize enough food to feed us all.

You will be interested in the actual shop viewpoint. The feeling of the man in the shop is that invisible ray hazards are to a considerable measure more academic than actual, and the general feeling is that the subject has been rather overdone. This is not given as my own opinion, but simply a feeling which I have gathered from the inquiries made. This makes it obvious that it is a function of those interested to carry additional enlightenment down farther in the organization of our business structure, until the actual facts can be made clear to those who are in immediate contact with production work.

Discussion

CHAIRMAN GUILBERT: We all thank you, Mr. Banash, for your illuminating remarks. I think it would be a good idea to have you come to our men and take up their time on goggles.

MR. BANASH: I think I had that pleasure some years ago, but may be you have a lot of new men or those who have forgotten it.

CHAIRMAN GUILBERT: We have no difficulty, as Mr. Banash says, in getting men engaged in that particular form of occupation to protect their sight.

CAPTAIN FISHER (Illinois Manufacturers Association): I notice most of your goggles have bows. What is the experience between the bow and the elastic band? In so many instances the men complain of the pain on the ears and we are urging the elastic band.

CHAIRMAN GUILBERT: I am like the fellow who said he was using candles because his grandfather used them. Now we have electric lights. I spoke about the supporting surface of the goggle. This adjustable goggle, with this metal temple, particularly in case of special lenses, for obvious reasons, is the thing; here is your bridge, where the weight is supported evenly and this keeps the lens in the proper position.

The elastic band facilitates the wearing of goggles on the cap or around the neck, because men can slip them down when the foreman isn't looking—they hang around his neck—or he can slip them up on top of his cap. With the temples you can't do that.

The luncheon says something about "Hard-Boiled" workmen. I don't believe there are hard-boiled workmen, any more than I think there are bad boys and bad girls.

Getting the "Hard-Boiled" Workman to Guard His Eyes

LEWIS H. CARRIS, Chairman

CHAIRMAN CARRIS: We are interested to hear something further from the oculist who spoke to us, supplementing one of the principal addresses this morning, and as he has to keep office hours, we will hear from him now. I suppose he has to buy another limousine for his wife next week, or something of that kind, and he has to get right away to get the wherewithal to do it. I am going to ask Dr. Davidson to talk right now.

DR. H. P. DAVIDSON (Oculist, Chicago, Illinois): In regard to the limousine, I am still waiting for mine; I am waiting until Mr. Ford gets his new product out.

The subject today is getting the men to wear goggles. I won't go into the technical part, because these men can tell you more about it in a few minutes than I can; they are actually out in the plant. From the oculist's point of view, I want to say one or two things. When a man comes to you and he has not perfect sight, you have to give him perfect sight, or as nearly perfect sight as you can give him. The first thing you have to find out from that man is where he is working, whether he is working in the tin shop or the steel shop, or in the open. The next thing is how he is working,—under artificial light, whether there are lighting facilities that are proper. Another thing is whether the man is way down under the car looking up, putting in a little screw. Another factor is his age. We have to know these four things before we can do anything about fitting the goggles.

I won't discuss the light situation. The education of the man has a great deal of bearing on just how to make a man wear goggles. If you find a man who is over forty years of age you have to consider the element of presbyopia.

We have not yet made goggles that will stretch like rubber. We have to put a bifocal on at the age of forty. It is a two-in-one glass. The bifocal is put down below as an invisible segment on the lower part of any glass for an individual over forty years of age who wears glasses, in order to let him see clearly. If you have a working man

who is looking up all day and screwing a screw in the top of a car, it is foolish to put his working segments down below because he will never use them. He will come back and say he can't wear his goggles, and he is right, because his close segment should be placed wherever he is looking. If we have an individual who has that kind of work, we have to do two things, give him a distant pair and a near pair, or we have to put the near segment above.

If we have another individual who looks off in the distance always and does not have to do any close work, we sometimes give that man just a distance goggle and not a close goggle. If that man has never worn bifocals and looks down, he finds things blur because the near segment is in the way. He is liable to fall off a scaffold, or have some other mishap. If he is a laboring man out in the yard, and does not read, the best thing to do is to give him only distance correction and not near correction.

To the intelligent man who does intelligent work and has to do both reading and distance work, we can give the bifocal glasses and he can get used to them in about a week's time.

There is one other thing I might say, that most of you know all of our eyes at some period of life have gone through certain diseases, like measles, and things of that sort, so that they are not perfect any more. It is more or less like a goose egg, it is warped, so we have to put a glass in front of the eye. That, you know, we call astigmatism. Most men can wear astigmatic lenses if they are sufficiently educated, but an individual who has not much education will come back and say, "Doctor, I can't wear those lenses."

"Why?"

"Things look lopsided to me. When I stoop down over a bench, the bench seems curved in the center."

I can't re-educate that man, I have to take off his astigmatic glass and give him a plano lens, or a plano lens with a reading segment. This may not be the correct thing to do, according to ophthalmologists, but it will get your workman back to work with protective goggles on and that is what we want; protection to the eyes.

The blurring of goggles occurs quite frequently. A man may be so situated that he is in a hot room one moment and then goes rushing into the cold. Immediately the steam accumulates. He does not like to wear his goggles for that reason. In the plant we have not found any real means to combat the steaming up. Mr. Guilbert mentioned this morning taking soap and cleaning them well and putting soap on afterward. That helps a good deal, but in a lot of cases we still have trouble with steam in certain occupations.

With respect to the heaviness of the lenses on the face, I think after you talk to your man and tell him why he is wearing them, he will follow your advice. Occasionally we have a man who says he has a broken nose and can't bear the pressure. For that man we have to make a special bridge so it will not rest on the broken place on his nose.

Occasionally we also strike an individual who says he will not wear the glasses because he has seen his oculist outside, and his oculist has told him not to wear those glasses. Usually we find that the oculist on the outside is an optician and not an oculist. We usually get a lot of co-operation from the private oculist. The opticians want to sell their lenses, of course. After you assure the man that he can see just as well through his goggles which are protective as he can out of his glasses which are non-protective, he usually subsides.

Finally, I only want to remind you that today industrial work is bringing on or contributing more to blindness than a great many other causes. It used to be ophthalmia neonatorum, blindness in childhood from venereal disease, but now it is in the industrial plant that we see most blindness. I suggest to the National Committee for the Prevention of Blindness that they take some steps to go into this detail of the work.

Chairman Carris: I spoke this morning of our appreciation of the co-operation extended by the National Safety Council, and in dealing with the subject of the "hard-boiled" or stubborn workman, the people who are interested in safety devices generally have that problem constantly before them. I wish that Mr. Owen, who spoke to us this morning, would supplement his address by telling us some of the experiences that he has had, or something that he knows about getting the hard boiled, stubborn workman to wear glasses.

Mr. Stewart J. Owen, Jr. (Safety Engineer, National Safety Council, Chicago): In the first place, I didn't know that there is such a thing as a hard-boiled workman. He might be a little bit obstinate, but I don't think you can call him hard-boiled. When you get underneath his skin you will find that he will wear the goggles about as quickly as anybody else. I do feel, however, that with some men, as Mr. Guilbert said this morning, it requires a mandatory rule. I also feel that once a rule has been made that goggles should be worn, everybody, from the president on down, should wear them, visitors included. It is not a very satisfactory state of affairs and does not help matters along at all for a foreman to come up and bawl a man out when the foreman himself or the safety man does not wear goggles. Perhaps I have been guilty of that very practice myself.

I feel that almost any man in the shop, if you approach him correctly, will wear goggles if he knows that he should. Some men will complain that the goggles hurt, others will say that goggles give them headaches, some of them say that goggles make them look funny. Of course, men like Guilbert know they don't say it that way. That is what they say in effect.

To cite one instance that I have in mind, I recall one very large plant where men said the goggles were heavy, were irritating to them, and gave them headaches. The safety engineer looked at the lenses in the goggles and saw that they were the kind to distort a person's vision. He took the goggles, went over to the storehouse, put in some new lenses, polished up the frames, and took them back. He said, "Try these—here are some new ones that have just come in." Mind you, they were the same goggles, the only change was that the frames had been polished and new lenses put in. The man said they were the lightest and best goggles he had ever worn. The man who complained really thought the goggles were heavy and uncomfortable, but it was all due to the quality of glass.

Adjustment is an important thing. Get the man to feel that the goggles are fitted to him individually. I might sum it all up with this statement: I don't believe you will find any man hard-boiled if you will listen to his complaint and try to adjust it—if you will be patient with him. You may have to work for some time, but the so-called hard-boiled man will respond, and when you do get him to respond, you will find that he is as enthusiastic about the wearing of goggles as a dog is for a piece of meat.

CHAIRMAN CARRIS: We want to hear some of that language which the Irish know how to use so well, both in blarney and in command. I have heard quite a little since this morning about a fellow called Pat Carey. I am going to ask him if he wants to talk to us.

MR. JAMES P. CAREY (Pullman Company, Chicago): Mr. Chairman, Ladies and Gentlemen: You know if you took the Irish out of the world there would be very little to tack the jokes onto. I got my education in what I am accused of by the Toastmaster in my long association with our esteemed hard-boiled safety director, Harry Guilbert. He is responsible for the things that we do or do not do in safety work at our plant. He is responsible to the safety world in general from the very fact that his record, I think, as a safety director for the Pullman Company, taking into consideration the territory and the many plants that he has to cover, will represent and compare favorably with, if not excel in many instances, any other similar corporation in the country.

He has, by his hard-boiled methods (and I will say there is no such thing as hard-boiled at our plant), at least he has, through his very earnest efforts, impressed upon all of our employees the great importance and benefit which they themselves, as well as their families, will derive from the protection of their eyes against injury.

I think I had presented to me by employees pretty much of every conceivable excuse or reason that the human mind could think of or concoct or scheme, as to why they should not wear goggles, when we first started insisting upon the wearing of goggles. Just recently we had a colored man working in our stripping department, taking off the metal parts from the cars when they came into the shops for refinishing, and so forth. I had information that he had refused to wear goggles, although he had been supplied with them. I spoke to him. He demurred. I gave him an opportunity to think it over and see if he could not accommodate himself to wearing them. He wore them for another day. At the end of two or three days he was again turned in to me. I brought him in with two others and talked to them about it. He finally said, "Mr. Carey, I can't wear goggles."

"Why?" I asked.

He said, "I'se got a spiritual eye. I see things, and with these goggles on I can't get along."

I said, "Now that you have a spiritual eye, a spiritualist's mind and altogether you are a spiritualist in your own estimation, were I to remove your name from the pay roll could you see your pay check on pay day?"

He said, "I guess I couldn't."

I said, "That is where you stand."

He didn't wear the goggles, his name was removed from the pay roll, and I guess the spirits are helping him to get along financially.

Hard-boiled action is not the thing to bring about results. We advise men, we call their attention to the necessity of wearing goggles, and we threaten them in this wise: "If you are again found without your glasses you will be dismissed or you will be suspended."

In seven years I have had occasion to dismiss only two men for persistently refusing to wear goggles. We gave them every opportunity in the world, but they stood out adamant against it. We just had to let them go. That very act, in effect, changed the minds of many others. We have today in the neighborhood of 1,250 men in our plant, and I should say that we are somewhat comparable to the adage that Ivory soap is 99 44/100 per cent pure. We are right there in the wearing of goggles, if not a little better. We are wearing them generally and universally. We have had the troubles, I guess,

that every factory has had, that every enterprise handling work of that character has had.

You can get more out of the men by giving them advice and calling their attention to the facts and giving the moderate threat that if they don't wear the goggles they will have to be dismissed. Bend back until your head touches the floor in tolerance; then, when you rise up, take action. With that moral effect you permeate the whole organization.

When we employ men we have them go to the doctor and they are examined. Before they go on the job they are supplied with goggles. If they complain after being on the job that for some reason these goggles are not suitable to them, they are again sent to the doctor and their eyes are examined and whatever changes may be necessary are made and the proper adjustments are given for the proper vision and comfort.

We had one or two cases where men were not comfortable. One man used seven or eight pairs before he got a pair that fitted him. I think he got the second pair that he first discarded, and they suited him fine.

I don't believe there is anything so important in safety work as eyesight conservation. A man may lose an arm, he can get through life, though it is true he will have certain inconvenience. Having lost an arm, he can get through life. He may lose a leg, with the same result. But let him lose an eye, or both eyes, and he is deprived forever of that window of the soul that God gave him and through which he expects to enjoy the pleasures and joys of the world. If he is a man with a wife and family and those children are reaching the mature age or are small, growing up, and it is the custom for a man's children to meet him when he is approaching home after a hard day's work, he usually picks them up in his arms and kisses and hugs them and finds out what they have been doing during the day, that paternal pleasure is radiated through his system, and the child is radiating its pleasure through the fact that the father has given it some attention. When the man whose sight is lost comes home—visualize for a moment the anxiety, the distress and the heartaches that the wife and mother suffers, to say nothing of the fact that those children can never again be pictured nor be looked upon by the eyes of the father. These are the things, friends, that bring home, in my opinion, a true and stern realization of why every man, woman, or child employed in any plant where dangers are present for destroying eyes, should take notice of these things. They complain of the nose bridge hurting, the back of the ears being

irritated by goggles, but when both eyes are destroyed, where does the irritation then radiate to?—to the home hearth, to the family head. He is there, blind as a bat, so to speak. He is a burden to the family and to himself.

A man with an ear or a leg or an arm off can get along through life and enjoy the fruits thereof, but when vision is lost it brings unhappiness to every member of the household. There are no words that I am capable of uttering which can impress upon everybody the importance of preserving the eyesight by wearing goggles continually while engaged in factory or shop. In my opinion nothing in safety work is more important.

CHAIRMAN CARRIS: I was told that Mr. Carey was 99 44/100 per cent efficient as a workman. He also measures up in the same way as an orator. I am sure the ministry or law or politics lost a good man when he became foreman for the Pullman Company.

I am going to ask Mr. Resnick to tell us three ways which he knows of educating the workmen. Apparently we can't use "hard-boiled." They may be wrong, or not. I am going to ask the gentlemen on the left wing to give their reaction as to whether these methods are right or not.

I suppose you are all familiar with this publication we are so proud of, *Eye Hazards in Industrial Occupations.* If any of you don't happen to have a copy, we will be glad to furnish you with one.

MR. LOUIS RESNICK (National Committee for the Prevention of Blindness): The Pullman Company apparently is exceptional in that it has executives who are so thoroughly sold on safety ideas themselves that they have dared to decide on a policy of letting men out when they refuse to wear goggles. That is not true of industry generally. There are many companies that have rules to that effect but don't enforce them. I have gone through plants and have seen workmen without goggles, working at grinding wheels, and there are big signs over the grinding wheels, "Any workman caught using this wheel without wearing goggles will be fired immediately." I walked right by with the safety engineer and nothing happened.

In many plants there is the problem of the hard-boiled workman because there isn't the executive attitude that you have at the Pullman Company. In going about the country, talking to safety engineers and going through industrial plants, I have seen a number of rather spectacular efforts to reach the hard-boiled workman. I will mention three that I understand have been very effective.

One of these spectacular stunts I know has been used in two or three places. It is this: The safety engineer will pick out a man

whom he has not been able to get interested in any other way, and will take up a position a few feet from him with a box full of glass eyes. He will pick up the eye and look at it and then look up at the man's eyes. He will keep that up until the workman comes over and asks him what the big idea is.

He said, "Jim, I just got word from the optical company that the price of glass eyes is going up, and I have orders to put in a stock of glass eyes for those who may need them. You are going to lose an eye, I guess, sooner or later, and I want to match one up for you."

Sometimes the man sees the joke, and the next day comes in and says he will wear the goggles. Sometimes the workman gets sore and it ends in a fist-fight. In this case that I am speaking of it wound up in the man's wearing goggles.

A former safety engineer of the National Safety Council used to do this. In fact, he thought it was so good that he made a general practice of doing it, especially when he was talking to a whole audience that was supposed to be hard-boiled. He would make his standard safety talk to them about the need of wearing goggles, and then at a certain point he would say, "And I know what I am talking about," and reach up and take a glass eye out of his eye, apparently, and then keep the lid closed. He had it in his pocket all the time. Such a gesture gets it across sometimes when nothing else will.

I have personally seen a human eye in a bottle of alcohol hanging on a bulletin board in a plant with a note like this, "This is Bill Jones' eye. We had to take it out of his head last week. If you want your eye here, don't wear your goggles."

That is awfully gruesome, but it seems that sort of thing is necessary in some cases. I understand that of all the thousands of safety bulletins that the National Safety Council has issued, two have been so much more successful than all the others that they have been talked about for years. They are extreme types. One is a very gruesome bulletin of an arm that has been badly infected and a number of incisions have been made and you can almost see the blood oozing out of the arm in the picture. That has been ordered and reordered for years because of its effectiveness and usefulness.

The other, which is even more popular, is the picture of a beautiful child with its hands up in the air saying, "Good-bye, Daddy, don't get hurt." In view of the fact that about 999 of the National Safety Council bulletins show protective devices and industrial scenes in plants, I think the success of these two bulletins proved, on the one hand, the need for doing something spectacular to reach the hard-boiled man, and, on the other hand, the need of getting under

his skin and getting to the real ordinary human being, as Mr. Owen said, through a bit of human interest.

Now, Mr. Guilbert, you can tear that to pieces.

MR. HARRY GUILBERT (Pullman Company, Chicago, Illinois): Ten years ago I used to carry an eye in a bottle of alcohol in my pocket and I have shown it to hundreds of men with little if any effect. This and other schemes I have tried repeatedly. Nothing takes the place of a mandatory ruling enforced to the limit.

All the methods referred to by Mr. Resnick may have had some effect in the plants where they were tried out. However, I am certain that they were not lasting ones. My remarks are based on many years' experience with three of the biggest corporations in America. I have tried every one of the schemes mentioned by Mr. Resnick, but they certainly did not bring about the desired results.

Whenever Mr. J. P. Carey has occasion to reprimand a man about wearing his goggles, he talks to him like a father and answers the man's objections with ingenious explanations. For instance, while walking through the plant with him one day, we noticed a good looking young fellow with his goggles on his hat. Mr. Carey asked him if he was married. He said "No" with a look of surprise upon his face, probably wondering what occasioned the manager's interest in him all of a sudden. "Have you a girl?" He smiled and said "Yes." "Well," said Mr. Carey, "you'd be a hell of a fine-looking object if you only had one eye when you called on her tonight."

Mr. Carey knows his men and approaches them from different angles according to the individual at fault and he does it in a kind way; the other course being useless as anyone with intelligence knows. All men are good in spots, whether they are car builders or not and they can be reached if one wants to take the time and patience and point out to them what might happen should they neglect to protect their sight.

Then, if after all this, you can't get results, there is only one thing to do, as Mr. Carey told the colored gentleman who objected to wearing goggles because he had a "spiritual" eye. Mr. Carey asked him if he could see his check if he was cut off the payroll.

Men can offer a thousand reasons why they should not wear goggles. I have enumerated them in my address. It isn't necessary to go into them here, but they can all be overcome by the leader, foreman, or superintendent if he is the right type of a man.

CHAIRMAN CARRIS: We have been talking about accidents in industry. The subject is how to educate the hard-boiled workman.

We are also reminded of the great responsibility those of us working for the prevention of blindness have as to accidents outside of industry. When we find people pretty hard boiled, we try to tell them what protection they should use in ordinary everyday life. Every oculist has a great many experiences. I wonder if the lady from South Bend who described herself as a plain ophthalmologist can tell us something about that.

Dr. Martha Lyon (South Bend, Indiana): There is one thing about accidents to children in which the public at large might be very well educated, and that is putting into the hands of the child a pair of sharp scissors for cutting out pictures. We have many instances of the scissors' slipping and one point entering the eye, either causing irreparable damage and making it necessary to remove the eye, or else causing a cataract. This may not be an industrial problem, but it seems to me from the outside point of view it is a factor along which a great deal of education could be done.

Chairman Carris: There are many other points that might be brought up, the matter of untying shoestrings with a fork. There is the question of air guns. Every Christmas time Santa Claus brings thousands and thousands of air guns. We had a clipping bureau, and you could note the curve of the number of eye accidents that would occur after Christmas time. Fireworks at Christmas time in the south always bring a crop of accidents. Of course, we have our regular Fourth of July crop of accidents. Those are circumstances where precautions could be taken. We strive to educate the public, but it is a large public, and funds are small, and it is hard to get the word to everyone. I wonder if we can't have a word or two from the Lone Star State, Dr. Anderson.

Dr. J. C. Anderson (State Commissioner of Health, Austin, Texas): Mr. Chairman, Ladies and Gentlemen: For some forty years I have been in very active country practice in a small town. I never have been connected with great industries where many people were employed. Consequently, this is entirely new to me. Just how much work is being done along this line in my state I have not been informed. There is some work on prevention of accidents among the big oil companies.

We have a bureau of maternity and infancy in our state with which all the doctors and some other people are familiar. We feel that in the last six years, since this has been operating, we have accomplished quite a good deal. The superintendent of our school for the blind tells me that since the law went into effect requiring the installation of prophylactic drops, so designated in the law,

which means nitrate of silver, he is noticing that the proportion of children applying for entrance into the blind school is decreasing, notwithstanding that our population is increasing considerably. We now have about five and a half million people. Still we have fewer children entering than we had five years ago.

I am very much interested in this subject. I came from St. Louis here to have the privilege of listening to the papers and discussions today and tomorrow, after which I am going down to Cincinnati to attend the American Public Health Association meeting. I am certainly delighted to be here and to have had the pleasure of meeting you face to face.

CAPTAIN FISHER (Illinois Manufacturers Association, Chicago, Illinois): In going around among the smaller industrial plants, I lament that in nine cases out of ten it is the lack of discipline that is to blame for the men's refusing to wear goggles. I try to meet all these different excuses, and I find the best thing after all is the real, earnest, sympathetic appeal.

I take out this glass eye and hold it in my hand. I say to them, "Men, that is the only piece of glass you can't see through." I tell them what compensation will do for them, but I ask them if they would give an eye for $1,700 or $1,900. I find that is getting under their hide. There is a responsive place in the heart of every man if you look for it. I find that in our work, that side, the humanitarian side, is the side to emphasize. I say to them, "I am not talking for the boss or for the insurance company, but I am talking for your good." I see everywhere the effect. I get a better hearing than the preacher; I know that because I am a preacher. Ever since the war the Red Cross begged me to come back into this work, and I returned, because it is a field that is vast and wonderfully productive. I rejoice very much in this work.

I want to thank you, Mr. Chairman, and those of the other organizations who have presented wonderful papers and elucidations of scientific and practical facts. It has been a wonderful help to me. I am going away with a greater emphasis on that side. We can't drive things, but we can lead.

CHAIRMAN CARRIS: I want to add just one more word. There has been a pretty sad picture painted here of the blind man and his hopelessness. There is another side to that. Those of us who are working with commissions for the blind and know about work shops, have come to know some blind men rather intimately, and we know that they don't always have the kind of a life which we, of course, describe to the sighted people. There is one pretty good

fellow. He is wearing a key that shows that he went to college and he had the highest marks. He received the Phi Beta Kappa key, which is the greatest scholastic honor to be conferred on any one. He did that after he became blind. George was seven years old when he lost his eyes. He has gone ahead and has been doing a wonderful work. I wonder if Mr. George Meyer won't give us his point of view.

MR. GEORGE F. MEYER (Supervisor of Sight-Saving and Braille Classes, Minneapolis, Minnesota): In one sense the picture the gentleman painted is correct, because it is difficult for any one to say too much about the personal aspects of the handicap of blindness. On the other hand, whenever we have a handicap of any kind, I don't care whether it is poverty or losing a leg, or losing two legs and two arms—no matter what the handicap may be—if it is anything short of losing your head, you can adapt yourself to it and you make the most of it. So I can say to the gentleman that I get just as much "kick" out of my youngster's coming down the sidewalk as I think he does, and I believe that my boy gets just as much "kick" out of me as any child out of his parent. Many of those pictures perhaps can't carry all the way through, but nevertheless, use it, gentlemen, for all it is worth, with your men, because you can't put it too strongly.

I was very much interested in the discussion regarding goggles. I tried to follow the whole discussion this morning, because along with my other duties I am President of the State Council of Agencies for the Blind. In that Council we have a Committee that devotes itself to the work of prevention. The Committee has been working for a couple of years along various lines, and one of its jobs was to make a survey of certain of the northern counties of Minnesota, to determine the reasons why some 300 cases of blindness had come about, and they found that injuries formed a large proportion of them.

The paper that reported these incidents gave rise to a conference. We had oculists there, and notably one doctor who did a great deal of work for large corporations such as the Bell Telephone Company, railroads, and so forth. He said, "As a result of the competition between industrial organizations and between subdivisions of the same organizations, and as a result of the intensive work similar to that being so well done by the Pullman Company, goggles are worn quite generally by persons in the employ of the large corporation. The place we can't reach is the shop employing from five to ten people, the small place where the foreman is simply an informal boss, where there are no rules and regulations, and where a sort of mutual understanding governs the workers."

He pointed out that that was really one of the difficult places to reach. So he suggested a campaign of education. Then he pointed out also that the rural problem was a great issue, not perhaps with reference to goggles, so much, as the matter of education with reference to accidents resulting from blasts, and so forth. In that connection I was interested in noting that there was practically no attention paid to the small shop in this discussion, and it seemed to me that it might put us, particularly the Safety Council, to thinking, and I have no doubt but that they have thought of that, to see what can be done about the small shop where the bars are likely to be let down and where accidents because of carelessness are perhaps even more likely to happen than in the large shop.

Section III

The Relation of Proper Lighting to Conservation of Vision

E. C. Crittenden
Lewis H. Carris } *Chairmen*

Illuminating Engineering Society of America
National Committee for the Prevention of Blindness

The Relation of Proper Lighting to Conservation of Vision

E. C. Crittenden and Lewis H. Carris, Chairmen

Editor's Note.—Since complete transcripts of all the papers are available upon application to the Illuminating Engineering Society of America, and since for the most part the papers were of such a technical nature that their chief interest would be to engineers and physicists, the National Committee for the Prevention of Blindness presents here only extracts of two of the less technical papers.

Dr. W. T. Bovie, of Northwestern University Medical School, gave an address on, "How We Have Learned to See and How We Have Learned Some Other Things." It was illustrated by a profusion of lantern slides. A large part of his address was devoted to an extemporaneous explanation and discussion of the slides and cannot be reproduced profitably without the illustrations. A simple outline of the course of his discussion, therefore, is all that can be presented here.

Dr. Bovie began with a discussion of some of the activities of simple protoplasm as represented in an amœba, dwelling principally on the reaction to light, the negative phototropism and the propagation of the stimulus throughout the organism.

He showed that what was true of amœba was also true of the plant, and that the reactions were identical. They are both formed of the same stuff.

After a short digression (apparently) on the nature of the record left in the protoplasm by a stimulus he continued by presenting his idea of the nature and the structure of protoplasm. He traces a large part of its activities to the fact that it is a very heterogeneous colloidal mass, with the molecules oriented at the interfaces between the phases. Owing to the forces resident there, stimuli are readily passed on and chemical processes are promoted. With the absorption of energy from the light, chemical activations are brought about that furnish energy for the "vital" processes.

In all of this, tissue is a factor quite as important as the three dimensional space that the organism occupies. The amœba—and man—are thus in reality four dimensional, the rhythm of the life processes and activities being an expression of the time element.

Following this general treatment, the evolution of vision was traced from the simple response of amœba to light to the highly elaborate structures found in the higher animals.

In addition to this paper, the following pertinent aspects of the relation between lighting and sight conservation were presented: "Intensity of Light and Speed of Vision, Studied with Special Reference to Industrial Situations,"* by C. E. Ferree and Gertrude Rand, presented and discussed by Professor Barker, Massachusetts Institute of Technology, in the absence of the authors; and, "Four Fundamental Factors in Seeing,"* by P. W. Cobb and F. K. Moss, of the Lighting Research Laboratories, National Lamp Works, of the General Electric Company, presented by Dr. Cobb.

* Reprints of these papers are available upon request upon application to the Illuminating Engineering Society of America, 29 West 39th Street, New York City.

The Correlation of Work for the Prevention of Blindness with Illuminating Engineering

Mrs. Winifred Hathaway
Associate Director, National Committee for the Prevention of Blindness

Perhaps you are all familiar with the old story of the man who paid a very excellent compliment to his wife by writing her epitaph, "The light of my life has gone out." When, however, he paid her a still greater compliment by taking unto himself a second wife, he felt constrained to add, "but I have struck another match." I think that this is the attitude of illuminating engineers, no matter how dead the community or how great the discouragements, they are always willing to strike another match and begin over again.

If you were to visit our headquarters at the Stevens Hotel you would see there a large map that bears the insignia, "Twenty thousand miles of sight-saving." This was a little journey that I recently took through the United States, Canada, England and Scotland in the interest of sight-saving, and one of the great eye-openers to me was the fact of the numerous other organizations that were doing our work, consciously or unconsciously, and the number of other organizations that we were representing, consciously or unconsciously. The National Committee for the Prevention of Blindness is saving eyes to use the light that the Illuminating Engineering Society is able to give, and the Illuminating Engineering Society is giving the light by which those eyes may see.

Will you try to think just for a moment of a city of 100,000 people, in which might be gathered together that number of blind people, representing just about the number of blind people in the United States?

If you can think of this community as being self-sufficient, you will then realize that it would offer a very sorry proposition for an illuminating engineer. Such community could, of course, use electric power, for sightless people are able to use many power machines just as well as sighted people can; they could also use power for heating and for cooking. But try to imagine that city as a sales proposition. There would be no necessity for any street lights; you wouldn't have to bother about whether the automobile headlights were within the law, because there would be no autos in that city;

you wouldn't have to consider whether house illumination or factory illumination, or school illumination came up to standard, because none of these need be lighted. Thus, you see that every person the National Committee for the Prevention of Blindness saves from joining such community is just one more person to use the light illuminating engineers are making possible.

So much for prevention of blindness, but, of course, that is not the important thing. The chief concern is conserving sight, and I think the Illuminating Engineering Society is far more of an actual factor in this than it realizes. For example, in giving adequate illumination properly controlled, illuminating engineers are really eliminating one of the greatest causes of eyestrain, and, in eliminating that cause, they are building up the general health of the people, because, of course, you all know that eyestrain reacts upon the general health, in some instances to such an extent that nervous breakdowns result. People treating for all sorts of difficulties are sometimes quite unconscious that the cause may be eyestrain resulting from using inadequate light or light that is improperly controlled. When illuminating engineers try to put into factories the proper lighting conditions, they do far more than appears on the surface. They not only make the worker far more comfortable, not only increase production and reduce the possibility of eye accident, but they actually increase the pay; when the pay is increased, it is like the house that Jack built, better economic conditions result. When economic conditions are better, there are better food conditions and better other living conditions, and, in consequence, better eye conditions. So you see that quite indirectly you are building up and saving sight just as you are building up a more understanding and appreciative attitude toward the correct use of light.

I think, perhaps, there is nothing more discouraging than to hear at a conference like this, "This is the National Committee for the Prevention of Blindness. Well, how DO you prevent blindness?" It is like asking you, "What is your philosophy of life?" when you hope you are living that philosophy so as to make it evident to everybody. I am not going to attempt, therefore, to tell you the long story of how we prevent blindness, but, rather, illustrate further, by one or two examples, the co-operative effort of which I have been speaking.

On this little journey of 20,000 miles of sight-saving I was particularly interested in school buildings. On such journeys I may forget my toothbrush, my umbrella or my rubbers, but there is one thing I never forget, it is my constant companion,—the foot candle

meter. Perhaps you illuminating engineers who use instruments so much more technical than this will wonder why I stress so simple a device. It is because it is the big entering wedge. I may go into a classroom and say to a superintendent of schools, "The children in this room have not enough light by which to do their work." He will naturally say to me, "How do you know this? Are you just guessing?"

Perhaps from experience I may make the guess a good one; but if I have nothing to prove my statement, nothing with which to demonstrate that my guess may be more or less correct, I shall have gained nothing. If, on the other hand, I can take the foot candle meter, show him how it works and let him prove the inadequacy for himself, he is willing, at least much more willing, to be convinced than he was before.

Suppose I do find—and this is not at all rare—one-tenth of one foot candle in some of our school buildings where we are expecting our children to use that great high road to education, the avenue of sight, then it is possible to say to him, "How can you expect results when you are not giving the possibility of getting them?" It quite naturally follows that he will want to know how many foot candles there should be on any child's working plane. If I answer, "A minimum of six, but ten are recommended for ordinary work and 15 or more in sewing rooms," his next question will be, "How do you know this?"

Then I feel so proud to be able to say, "The Illuminating Engineering Society, and the American Society of Architects, together with numerous other organizations, have given us a code of lighting school buildings in which these things are set down for us, having been worked out through the scientific research and experience of people who know what they are talking about."

In one city where the superintendent had to be convinced he said, "If you will actually show me that the schools are not providing adequate light for these children, I will promise to do something about it."

So we tested several of the schools, making the notations and submitting the reports; when he saw them, giving an actual exposition of what was in his own school system, he not only was willing to take the matter into consideration, but has had, since that time, practically every one of his old school buildings relighted, and special attention, never before accorded, given to the new buildings.

We attempt, of course, not only to have good lighting conditions, natural and artificial, properly controlled in the classrooms, but also

to consider the reflective value of walls and ceilings. In this we naturally turn again to the illuminating engineer. There is one thing in which the Illuminating Engineering Society can doubtless help us and that is in educating people to appreciate the value of dull finished furniture.

In a beautiful new high school I saw the other day the lighting was practically perfect, the walls and ceilings had been most carefully considered, dull woodwork had been chosen for every part of the finish of the building; then some one had been inspired to put in highly polished furniture in golden oak. When one looked in at the doorway of classrooms, the glare seemed to strike directly into the eyes. There wasn't any need for the high school girls occupying these rooms to take out their little vanity cases and use the mirrors because they had full reflection from their desks.

When we take the matter up with the manufacturing companies, they say, "There isn't any demand for dull finished furniture." The demand must be created before we can hope for the supply.

I cannot, of course, bring to you the light that you are so willing and able to give—even if I could, it would be bringing coals to New Castle, but, representing the National Committee for the Prevention of Blindness, I can be a messenger of light and tell you that the most inspiring thing I saw in all my travels was the new attitude toward lighting conditions in the home, the school and the factory.

It would seem, therefore, that working together, the Illuminating Engineering Society giving the light and the National Committee for the Prevention of Blindness helping to save the eyes by which this light may be seen, that we may all confidently look forward to the time when the great light way which you are building and the great sight way which we are building will merge into a great white way by which the children of man may attain unsuspected heights.

Section IV

Necessity of Correcting Eye Defects in School Children

Harry S. Gradle, M.D., *Chairman*

Illinois Society for the Prevention of Blindness

Necessity for Correcting Remediable Eye Defects in School Children

Harry S. Gradle, M.D., Chairman

Chairman Gradle: Not to bore you with any unnecessary words, we will proceed immediately to the program of this afternoon's meeting. Before we take the pleasure of listening to the main speaker, we wish to call on Dr. Wilder to voice the sentiments that we here in Chicago feel at one of the most grievous losses that has occurred to the Illinois Society.

Dr. William H. Wilder: We had hoped to have with us today the Secretary of the Illinois Society for the Prevention of Blindness, Miss Marion Campbell, who died last spring. I wish to offer to this meeting a memorial from the Illinois Society for the Prevention of Blindness, of which she was the Executive Secretary.

In Memoriam: Marion A. Campbell.—"The Illinois Society for the Prevention of Blindness desires on this occasion to express the great loss it has sustained by the death of its most valued Executive Secretary, Marion A. Campbell. Her anticipation of attending this conference, in whose purposes and arrangement she had shown great interest, was stilled by an unforeseen and fatal malady. Through years of training in social service work and other fields she had unselfishly consecrated her life to the cause of service to humanity, and her heart went out particularly to those who live always in the dark. Before she came to Chicago her efforts had been largely among such sufferers, and she fully realized the importance and value of prevention. In the many years that she labored with such devotion and faithfulness among us in the cause of preventing that great affliction, blindness, she not only endeared herself to her co-workers in this field, but through her beautiful humanitarianism and unfailing zeal alleviated suffering of many afflicted ones and stimulated others to aid in their relief. Her work will live after her."

Dr. B. Franklin Royer (National Committee for the Prevention of Blindness): I should like to move the unanimous adoption of the resolution and that the Secretary of the National Committee be instructed to spread this resolution on the minutes of this meeting; further, that copies of this resolution be given to the press and various other social agencies in the city and the national social agencies.

CHAIRMAN GRADLE: That motion is adopted. The meeting will please rise and stand for a moment in memory of Miss Campbell. . . . (The audience stood in silent tribute to the memory of Miss Campbell.)

CHAIRMAN GRADLE: The address of the afternoon, "Necessity for Correcting Remediable Eye Defects in Chicago School Children," is to be presented by the Dean of Chicago Ophthalmologists, a man to whom we have all looked up for years with respect and whose opinion today stands the highest. I take great pleasure in asking Dr. William H. Wilder, of Chicago, to present the paper of the afternoon.

DR. WILDER: I have been asked to present some thoughts on the subject of the necessity for correcting remediable eye defects in school children, another way, really, of expressing what our societies stand for,—the conservation of vision.

In a not very long paper I will try to present an argument in favor of the idea that we should have more active help in this movement from educational boards. The idea of prevention and of conservation is uppermost in the minds of people generally, but we often differ as to where the particular function lies or what particular body has the responsibility of carrying out a certain movement. In this great body politic, as in our body anatomic, these functions sometimes conflict.

I want to outline for you some efforts that the Illinois Society for the Prevention of Blindness made to bring this thought to the attention of the authorities, particularly the educational authorities, in the form of a survey that we made.

Necessity for Correcting Remediable Eye Defects in Chicago School Children

WILLIAM H. WILDER, M.D.
Emeritus Professor of Ophthalmology, University of Chicago, Chicago, Illinois

Few people realize the prevalence of eye defects that impair sight. Before an audience of educated men and women such as this, it would seem hardly necessary to make an argument on the value or necessity for correcting eye defects in school children, for probably it is obvious to all of us on presentation of the subject.

But comparatively few intelligent people, unless their attention has been called to it, are aware of the magnitude of the problem of conservation of vision of school children, and too few are interested to the extent of using their influence to further the efforts being made by certain agencies along this line.

In a report of the U. S. Commissioner of Education about three years ago there appeared this significant statement:

"In the second report of the Provost Marshall General in the operation of the Selective Service System it is shown that 10 per cent of all rejections of drafted men were on account of eye defects. This does not include a large number of men with eye defects of a minor character or with eye defects corrected by glasses, who were classified in the limited service group. Furthermore, it does not include those men having eye defects, corrected or uncorrected, who are definitely rejected for other defects before their eyes were reached in the order of examination. The figures, however, are sufficiently large to demonstrate that visual defect is responsible for a substantial impairment of manpower needed in time of war, no less than for pursuits of peace.

"This is merely a confirmation in a dramatic way of the facts that have been revealed by examination of the eyes of millions of school children in all parts of the civilized world during the past generation. A conservative interpretation of the data revealed by these examinations would be that approximately 20 per cent of all school children are in need of corrective treatment for eye

defects. Also it has been demonstrated that there is a progressive increase of eye defects with grade progress in the schools. It is clear, therefore, that the care and protection of the eyesight of school children is a school duty and a school problem. It is incumbent upon the schools, not only to discover defects and disabilities that impede growth and interfere with school progress, but also to make the conditions of school life and school practice such as will conserve and promote the physical and mental fitness of the children."

Desiring to test the truth of this statement and to learn the extent of the educational and health problem resulting from eye defects of school children in Chicago, the Illinois Society for the Prevention of Blindness, in May, 1920, suggested to the Commissioner of Health a co-operative plan whereby the Society should conduct examinations of the eyes of pupils in a selected group of schools where conditions might be expected to be typical of those in the school population at large. The plan was accepted by the Commissioner of Health and received hearty concurrence of the Director of Special Classes under the Board of Education.

A certain school in the Stockyards district was selected for the first work, as representing a variety of nationalities and home environments. The examinations were made by two ophthalmologists, appointed and maintained by the Society to serve as members of the staff of medical inspectors under the Department of Health, but to specialize in the examination of the eyes of the entire school population.

These two eye experts spent 32 days in examining the 681 pupils in the eight grades above the kindergarten for eye defects and refractive errors. Of this number 345 were found to have normal vision. Three hundred and thirty-six, nearly 50 per cent, were found to have some defect of vision, most frequently of refraction, and of these 105, more than 15 per cent of the whole, had symptoms of eyestrain. Among the pupils with visual defects more than half, to be exact, 185 of the 336, had never had any kind of an examination during their entire school period.

In explanation it should be stated that two years previous to this survey, the Board of Health on account of limited budget, had withdrawn two ophthalmologists from the staff of medical inspectors in the schools, and the staff had been so reduced otherwise that it had been practically impossible to consider routine examinations of the eyes of pupils except in those obvious cases where a condition approaching blindness rendered the pupil unable to do classwork.

Moreover, the authority of the Health Department for making physical examination of pupils, except for suspected contagious disease, is so limited as to preclude special examinations of any nature. Likewise the Board of Education lacks the authority to expend funds for medical service for the general school population, and so could not supplement the service of the Health Department by an adequate supervision of the health of the pupils.

This survey demonstrated the importance of eye examination in the schools for it is obvious to any intelligent person that a school child with a handicap of defective vision will have great difficulty in keeping up with the classwork or may fail utterly. Furthermore, even if vision is good and there exists refractive error of the eyes, such as hyperopia or astigmatism, the resulting eye-strain may cause lassitude, drowsiness, eyeache, headache, and other nervous disturbances. Then naturally follow inattention, lack of concentration and interest, and inability to keep up with the work. For reasons of this kind, a child may fail to make the next grade and become a repeater and even be withdrawn from school under the idea that he is backward, all for the lack of a careful examination and a pair of properly fitting glasses.

It is appropriate here to speak of the development of sight-saving classes for pupils—not blind, but so seriously handicapped by limited vision as to be unable to make progress in the regular classroom. In the growth and development of state institutions for the education of the blind in this country, it became a practice to enroll as students, pupils known as "border-line pupils" because they were neither blind nor seeing. Because of their difficulty in reading the print of the usual textbooks in ordinary school work it was assumed that they must abandon for reading the little vision they had and use the fingers in the tactile system of reading. But this assumption was not according to nature; it developed that these pupils would invariably strain the little vision they had in trying to read with the eyes the raised points of paper which the blind feel with the sensitive finger-tips. Many superintendents of these institutions assert that such pupils often lost the little sight they had through this persistent practice.

The establishment of special classes for these pupils in the public schools with such equipment as would relieve their poor sight from undue strain, was, therefore, a real sight-saving service to this class of pupils. Because of the necessity for much individual work and of the variety of grades represented in the group, the sight-saving class is limited to an average of twelve pupils; the expense

thereby entailed is borne in Illinois by the state, under an Act passed at the time of establishing classes for the blind in the public schools, the excess per capita being a nominal amount and inconsiderable in proportion to the advantage to be gained in eliminating repeaters in the grades, and in holding in school for a longer period pupils who otherwise become discouraged and join in the ranks of unskilled workers for whom there is so little in the future.

Pupils assigned to these classes are in no sense segregated from the pupils with normal sight in the school, except for the preparation of the lessons, in which they require books with large print, relief maps, adjustable desks which also can be moved near to window or blackboard, and typewriters for written work. Pupils go to the regular classroom to recite with the grade in which they are enrolled; they take part in all general exercises in the building and graduate with full honors, on the merits of work accomplished, equally with the pupils who have normal vision. Sight-saving class work is frequently of assistance to pupils who have recovered normal vision but are retarded in their work owing to their absence while under treatment for a visual defect; they justify personal attention while making up such lost work.

The Illinois Society for the Prevention of Blindness has continued the service of arranging for eye examinations, correction or treatment of visual defects and recommendations to school assignment by the examining physician. Cases are referred to it from various sources and by various agencies, chiefly from the schools by the visiting doctors of the health department, the principals, teachers, and visiting nurses. If in the preliminary tests by school physicians, teachers, or nurses the vision of the child is found lower than normal, or if children are unable to do the required eye work in school they are referred to the Society and it through its workers or through other agencies see that they are properly examined by experts either in clinics or privately. After thorough examination and correction of visual defect or disease of the eyes, the examining physician is asked to recommend school assignment on the basis of the amount of vision secured, and safety to the sight of the patient. Pupils are assigned to: (1) Regular class work; (2) sight-saving class work; or (3) classes for the blind.

A record of the vision test, diagnosis, prognosis, and school recommendation, as well as recommendation for any further advised treatment, is returned to the Department of Health and to the Board of Education; transfer to sight-saving classes or classes for the

blind is made by the Board of Education and pupil escorts are provided for pupils not able to travel alone. The extent of the increase of this co-operative service with the Department of Health and the Board of Education—Division of Special Classes—is shown by the following numbers of cases referred to the Society for such service:

School Year:

1920–21	248	1924–25	1,310
1921–22	352	1925–26	1,189
1922–23	440	1926–27	1,459
1923–24	1,206		

If Boards of Education realized the great expense incurred in providing room and teaching service year after year, in the grades, for repeaters whose eyes are their educational handicap, and if it were known with what comparatively simple corrective treatment these pupils are frequently relieved of their handicap and put into line for promotion with the prospect of good vision for the balance of their school years, they would certainly conclude that attention to this particular health condition of school pupils is a wise economic measure.

With the opening of the next school year, in September, 1920, we were asked by the Director of Special Classes under the Board of Education to furnish special eye examinations for all pupils enrolled in the classes for the blind, and for such other pupils selected by principals, teachers, and nurses in the schools, who have known or suspected defects in vision. In including service to the latter group it was indicated that special classes—sight-saving classes so called—would be promptly established for all pupils found to have unremediable defects of such a degree as to impede normal progress in the grades. It seemed desirable to meet this request, hoping that it might lead to the establishing of such classes for all school pupils needing limited eye work.

In examining the eyes of school children considered practically blind, and of children of school age suffering from grave defects of vision, the work must be of the most painstaking character by experienced ophthalmologists, involving patient and faithful co-operation on the part of the parents and the patient. General health conditions underlying eye ailments must be thoroughly tested and often a period of general treatment undertaken before results can be secured.

Many of these cases were examined in the centrally located eye clinics and many ophthalmologists gave gratuitous attention in their private offices to children deserving free service. Forty-six schools referred 248 pupils asking for examination of eye defects that were suspected of retarding progress in school. The findings were:

Referred for suspected defective vision	248
Found on examination not needing treatment	27
For whom corrective treatment gave improved vision	178
Referred back after correction to regular classes	74
Referred to sight-saving class	18
Found appropriate for class for blind	5

The plan for this service was continued the following school year September, 1921–July, 1922, with little variation. The worker on the staff of the Society detailed to this work made home visits, discussing with the parents the visual defect found and learning whether attention would be secured by the family or through a free clinic, this being determined by the ability of the family to pay for service and glasses if needed. The worker's attention was also directed to overcoming any prejudice the family might have against the use of "drops" in the examination and refraction of the eyes and to persuading the family to refer to experienced eye specialists for such examination rather than to the variety of stores and offices where advertised free examinations and cheap glasses often prove too alluring to parents with limited means.

For the 63 pupils found this year appropriate for the sight-saving classes, the Board of Education promptly established such classes. Tested equipment and appliances adapted to eliminating undue eyestrain were installed and a program of balanced book work, manual training, and recreational games worked out for the pupils. Teachers gave the most patient individual attention to the requirements of the variety of eye ailments represented among the pupils.

The satisfactory operation of these sight-saving classes demonstrates the successful outcome of joint medical and educational service for those physically handicapped. In the diagnoses of this group of pupils are found myopia, strabismus, congenital cataract, sympathetic inflammation following injury, and other acute inflammatory eye ailments as well as eye conditions associated with general disease, all of which result in permanent handicaps of partial or total blindness if undiscovered (and so untreated) during the early stages.

The following is a tabulation of pupils referred, examinations made, corrections effected and school recommendations made for school year September, 1921–July, 1922:

Pupils referred by 77 schools	352
Found appropriate for clinic service and distributed among seven clinics	191
Able to pay, and sent to their own physician	85
Preferred to see an optician	18
Found on examination not needing treatment for eyes	30
Would not co-operate and treatment was deferred	10
Under treatment or observation at end of school year with diagnosis and correction deferred	18
Found to need general medical or neurological treatment and refraction was deferred until result of general medication could be determined	10
Advised to arrange for operative treatment	12

There were 273 corrections made and glasses secured; nine were given operative treatment.

The school recommendations provided that 210 go back, after correction, to full-time eye work in regular classes; 63 were referred, after all possible correction, to the sight-saving classes; and 21 were referred, after examination and any suitable treatment, to the classes for the blind.

In the plan for continuing the service during the next school year it was arranged jointly by the Health Commissioner and the Director of Special Classes under the Board of Education that school physicians in making the vision tests during the routine examination of pupils should list all with vision below normal to be referred to the Director of Special Classes who should further classify them, referring all pupils with vision of 20/70 or less in the better eye for the specialized service of this Society. All pupils with vision better than 20/70 were to be referred to the service of the school nurses.

As the staff of school physicians was this year increased by the addition of fifty men to give full time to the physical examinations of school pupils, we were able to serve a much larger number of pupils.

Following is the tabulation of pupils referred, treatment secured, corrections effected and school recommendations made in school year September, 1922 to July, 1923.

Pupils referred by 102 schools..... 440
Examined, refraction tested, or otherwise treated, given glasses and recommended back to regular classes for full time eye work..... 276
Found needing only such treatment as could be arranged through the school nurse and so referred... 53
Found not co-operative in arranging for treatment.. 13
Found to be mental defectives with normal vision.. 5
Found to be a cardiac patient with normal vision.... 1
Found to be deaf rather than to have vision defects.. 1
Moved before treatment was satisfactorily completed..... 8
Recommended for sight-saving class work..... 69
Recommended to the classes for the blind..... 6

The detailed report of this joint service by three co-operating agencies covering a period of three school years, embodies two very definite fields of service: (1) Sight-saving treatment for a large group of children of school age, resulting in greatly improved vision in much more than sixty per cent of the group. (2) The establishment of a system of special classes appropriate to securing for partially sighted pupils an educational opportunity equal to that afforded seeing pupils.

It will be seen that in the three years of this service 1,721 pupils were referred for examination; that it was possible to improve vision in 815 and refer them back to the regular classroom from which they had been sent for examination, as unable to do the required work due to a suspected eye defect. For the 151 referred after examination and all suitable treatment, to the sight-saving classes, much was done to prevent progress of high refractive errors, to arrest disease that might further impair sight, and to regain vision through operative measures.

A summary of pupils examined, corrections effected and school recommendations made in three years, discloses the following:

Year	Number examined	Defects found	Corrections made	Referred to regular class	Referred to sight-saving class	Referred to classes for blind
1920	681	336	6	5	1	0
1920–1	248	221	178	74	18	5
1921–2	352	294	282	210	63	21
1922–3	440	372	349	276	69	6
	1,721	1,293	815	665	151	32

A very valuable feature of this work, however, does not appear in these summaries, but is found incidentally in the education of parents who are persuaded to use "drops" for the testing of eyes previously "fitted" without such aid but with glasses which did not help. It is found in the story of a lad who wore his cap in school to protect his eyes from the ordinary light of the school room in whose case it was found that an injured eye neglected because not painful at first, was affecting the sight of the uninjured eye. In this case the good eye was saved with part vision by emergency treatment which had to be urged upon parents who could not realize the threatening danger. It is found in the case of a young girl suffering from birth with congenital cataracts for which no operation had been allowed because the physician who had been consulted naturally was not willing to "guarantee" a cure. In this case, when permission was reluctantly granted to operate on one eye at a time, the cataracts were successfully removed and glasses fitted, a previously blind child was thus returned as a seeing pupil to a regular classroom. Sight-saving classes for such pupils were established in five of the school buildings, two such classes being established in three of the buildings.

If the state may require school attendance for a period of from ten to twelve years it should have the authority to determine whether hearts, eyes, ears, minds, or other physical endowments are equal to the strain without adjustments and specialized treatment. We believe it to be the next step in health for its citizens that Illinois shall fall into line with the majority of the other states which have acknowledged their obligation and privilege thus to provide for the future strength of their citizenship.

The Illinois Society for the Prevention of Blindness thinks the Board of Education in this state in some form of co-operation with Health Boards should be empowered by legislative enactment to expend money for the purpose of examining the eyes of school children to discover defects that may be a handicap in their school work. Furthermore, the Board of Education should have power to employ expert assistance to correct such defects in those who are financially unable to pay for such service.

It certainly is not the duty of the medical profession, any more than it is the duty of any particular class of society to render gratuitously this important service to the community. The expense of it should be borne by all, but expert practitioners in this field could and should do much in the way of direction and assistance.

The State of Illinois is backward in looking after its handicapped citizens. More than half the states in the Union have laws requiring medical inspection of schools, not of eyes alone, but of ears, throats, teeth, hearts, lungs, etc., but Illinois is not in the list of those that have such enlightened laws.

But criticism to be of most good should be constructive, and in closing I venture to offer this suggestion. Why should not the Board of Education of Chicago be empowered to establish a number of eye clinics in suitable parts of this great city and employ at a reasonable salary trained ophthalmologists to examine and correct eye defects of those school pupils who are entitled to free service and do not care to go elsewhere for such attention? Such clinics, I should say, need not number more than ten or twelve which, with the eye clinics already in operation, would probably supply the need. They could be operated in conjunction with ear, nose, throat and dental clinics and possibly could be held in certain school buildings, thus reducing the expense to a minimum. The expense of such an undertaking would be comparatively small, the good accomplished would be incalculable. Such a plan is already in successful operation in Cleveland, Ohio, and in New York, although in the latter place I have heard that the ubiquitous politician has begun to meddle with the scheme, a danger we always have to face.

In developing this survey of finding and correcting eye defects in early school years, the Illinois Society for the Prevention of Blindness has had the most cordial support of the officials of the Department of Health and in the Board of Education, and has thereby been able to carry out a conclusive demonstration of what such joint effort may mean both in health and in educational benefits to the school population. The possibility of permanent benefit through such service is beyond question and should speed the time when the entire fields of physical defects and handicaps in school pupils will be a matter of concern to the state and their correction will be regarded as important as progress of the pupil in book knowledge.

Discussion

CHAIRMAN GRADLE: The discussion of Dr. Wilder's paper was to be opened by Dr. Cornell. Unfortunately, he is not present. His discussion will be presented by Dr. B. Franklin Royer.

DR. ROYER: Mr. Chairman, Members of the Conference: It is a great regret to me that Dr. Cornell could not be present. Those of

you who know his work are perhaps aware of the fact that he has been actively connected with the medical inspection of school children in the city of Philadelphia since it was organized there in 1905. You are, of course, more or less aware that the health supervision of school children was begun within a two-year period in a series of large American cities, starting in Boston, and within two years organized in a large way in New York, Philadelphia, Chicago, and in Pittsburgh, and in perhaps about that order. The work here, as you remember, was organized under the late Dr. Spaulding, carried on by Dr. Jones, and is at the present time under the supervision of Dr. Niblock. Dr. Cornell speaks from many years of the closest of contact.

Health supervision of school children was organized under the Health Departments, and for the most part has been carried on under the Health Departments, although within recent years it has been entirely turned over to the Board of Education in the city of Boston. In relation to Cornell's work, within a few years it has been shifted about this way: Dr. Cornell is in the employment of the Health Department and his salary comes from the Health Department. Such facilities for correction of the remediable defects as are provided from public funds come through the public health department. The salaries of all the school nurses and all of the school doctors, numbering several hundred individuals, come from the public school budget because they have a separate taxing power. Dr. Cornell sent a letter with this paper expressing his regret that he could not be here.

Necessity for Correcting Remediable Eye Defects in Philadelphia School Children

WALTER S. CORNELL, M.D.
Director of Division of Medical Inspection of Public Schools, Philadelphia, Penna.

Physicians and teachers are already aware of the ill effects resulting from uncorrected eyestrain and uncorrected defective vision. Headaches, migraine, impaired digestion, strabismus, bad posture, myopia, and habit-spasm (tic) may be mentioned as the most important of these effects, which are well known from the standpoint of health.

From the standpoint of scholastic progress, the ill effects of neglected eyes cannot be demonstrated easily. This is because most of the studies which have been made have been faulty in method—different degrees of refractive error, simple hyperopia, and pronounced astigmatism having been included in one common group called eyestrain.

To investigate properly the influence of refractive error on the scholarship of the child, any study made should be made with some regard to the degree of vision existing. When this has been done, a definite correlation between very poor vision and lowered scholarship will have been demonstrated. Thus, several years ago, in the Allison Public School, Philadelphia, the comparison of one group of children possessing normal vision with another group possessing vision less than 15/30, showed that the former attained a scholastic rating of 75, whereas the latter had a scholastic rating of 69. An early investigation, which has not attracted the attention that it should, was that made by the London County Council in the year 1904. Here the visual acuity and scholarship (school grade) of 20,000 pupils were noted. Taking at random one group of these pupils—the girl pupils of the fifth grade—analysis of the report shows that among the bright children represented by those 10 years of age the ratio of bad vision cases to good vision cases was one to eleven, whereas among the dull children, represented by those 15 years of age, the ratio of bad vision cases to good vision cases was one to six.

Every one experienced in school work can recall numerous individual instances of marked improvement in scholarship following the procurement of needed eyeglasses. The field of school medical inspection is a great one, and the correction of eyestrain in school children is a very definite part of its work. We know that about 17 per cent of all school children possess vision not better than 15/20, and that approximately four per cent suffer from headaches and other subjective symptoms due to latent hyperopia or some form of refractive error in which the distant vision is maintained, as shown by successful reading of the Snellen type. We thus have about 21 per cent of all school children undoubtedly needing correction. Those who believe that slight defect in visual acuity is always an indication for eyeglasses, are of the opinion that 25 per cent to 28 per cent of all children should wear them. Without venturing to express an opinion regarding ideal conditions, I have, as a school health official, formed the opinion that 20 per cent represents the proper proportion of children needing correction, when all medical and social factors have been considered.

Unfortunately, for the purpose of this paper, no recent survey has been made in Philadelphia to demonstrate the proportion of pupils wearing eyeglasses. A survey of several schools made in 1905, when school medical inspection was first instituted, showed that only four per cent of the children were provided with eyeglasses. A survey made about the year 1916 showed that the number had increased to 10 per cent. This is our last definite report. At the present time, the number must be estimated by studying the number of eyeglasses recommended every year, the number obtained, the total school population, and the number of glasses obtained as replacements.

The public school population of Philadelphia numbers about 275,000, some 27,000 young children entering the lower grades every year. The reports of the Division of Medical Inspection, with a remarkable uniformity in the number reported show that approximately 20,000 cases of eyestrain or defective vision are recommended for correction each year. In 1926 the number was 22,800. It must be borne in mind that many of these children are pupils who have been similarly urged in previous years to obtain proper correction but have neglected to do so. It must be further remembered that some are children who have broken or lost their eyeglasses, and some are children whose glasses need changing. Therefore, the number of new young children who are found to need glasses is far less than the total number of recommendations for eyeglasses. The

figure 22,800 simply shows the situation which exists, and which the school physician and school nurse are employed to correct.

The Philadelphia schools contain a number of special sight-saving classes, with a present enrollment of 181 children. Children are admitted who possess binocular vision less than 15/70, or who suffer from myopia of marked progressive character, and there are a few children with degenerative disease of the eye without primary regard to the matter of visual acuity.

In the spring of 1927 a thorough search was made in every elementary school to discover children in regular classes who should be placed in the sight-saving classes. Dr. S. W. Newmayer, after personally examining some 4,000 children found with vision of 15/50 or less, reported that all but 60 of these were children without glasses, and that glasses would give at least 15/30 vision to all except 84. Of the 84, he recommended 60 for sight-saving classes. It is an important point that these 60 children, plus the 181 already enrolled, represent the total number which are regarded by the Philadelphia authorities as proper pupils for sight-saving classes. The elementary school population in Philadelphia is 202,000. Thus, slightly more than one out of every 1,000 pupils should be placed in a sight-saving class, according to Philadelphia records.

While the importance of sight-saving classes should not be underestimated, and their existence has been a boon to thousands of unfortunate children, it appears that the principal work in the field of vision conservation is to be done right in the regular classroom of the school. We should bear in mind that only one-third of the 240 children either placed or nominated for the Philadelphia sight-saving classes are suffering from eye conditions which may become worse by reason of continued work in the regular classroom. Two-thirds are children who are placed there entirely for educational reasons—namely, because they cannot read ordinary sized type or see the blackboard under ordinary conditions. The majority of these children suffer from corneal opacities or cataracts which impair vision but do not cause eyestrain. Contrasted with the relatively small number whose eyes are being saved by placement in sight-saving classes, is a far greater number of children who are suffering from severe eyestrain, which can be relieved by simply procuring the needed correction.

The work to be done in the regular classes of the school system is well shown by the 1927 investigation in the Philadelphia schools, already mentioned. About 60 of the 4,000 children needing correction already were wearing eyeglasses, the remaining 3,900 possessed

no glasses at all. Thus we have, or did have a few months ago, the situation in which 3,900 children, with vision of 15/50 or less, all correctable by proper glasses, were sitting in our school rooms, having resisted the efforts of the medical inspectors and nurses, for years, to have them obtain the needed corrections. Our next step must be to report these recalcitrant cases to the school authorities so that the influence of the class teacher, the principal, and even the superintendent, may be brought to bear in stirring this group of ignorant or selfish parents to action.

Finally, the educational system of the present day is gaining in efficiency. Causes of school failure are being sought and the remedy applied. The value to the young man and young woman of good health and good appearance in the practical work of securing a job and advancing in that job, is realized as never before. In this plan of better education, those who are interested in the eyesight of the children must come forward to do their share of the work.

Discussion

Dr. John Green (St. Louis, Mo.): While I was serving on a medical advisory board in St. Louis in 1918, I was impressed with the number of young men who came before this board for irremediable eye defects—albinism, retinal degeneration, congenital cataract, and the like. Usually they had been compelled to stop school in the third or fourth grade. As a consequence, they had never risen in the economic scale and were, for the most part, day laborers.

I feel that this whole question is primarily a school duty. Of course, the school must seek the advice and skill of the ophthalmologist in order to solve properly the various problems connected with the education of the semi-sighted.

We should fight against the tendency to exaggerate the number of school children who require glasses. There is one organization in this country backed by the optical interests which, for purposes of propaganda and for commercial reasons, tends to exaggerate the number of defective eyes in those engaged in industry and in those in schools. Every child that needs glasses or ocular attention of any sort should have it, but it is absolutely wrong to state that fifty per cent of children need to have glasses or eye attention.

How shall we handle the children who, by tests, show 20/20 or 20/30 vision? Many of those children need the attention of the oculist. Many of them are farsighted. Some have low grades of astigmatism associated with the farsightedness. Many of those children are the subjects of eyestrain. If it is assumed on the basis of the excellent distant vision that the eyes are not at fault, it is not a proper assumption. I suggest that the 20/20 or the 20/30 child who is backward in his school work should be questioned in

regard to symptoms of eyestrain, such as headache, blurred vision, watering of the eyes, marginal lid inflammation, any or all of which may be associated with uncorrected hyperopia or hyperopic astigmatism.

In regard to sight-saving classes, I have the impression that pedagogical methods are not altogether standardized; that, to a large extent, each teacher tries to work out her own salvation. Perhaps present experimentation is needed to sift out good from bad methods. I had the opportunity and privilege of attending two of the Chicago sight-saving classes, and what I am about to say is not in the way of criticism, but merely by way of suggestion. I found, for instance, that the electric lights in one room were entirely inadequate; in another, the globes, while apparently adequate in illuminating power, were placed in a high ceiling, too far above the desks. I found that almost all of the children had scratched lenses, some of them so badly scratched that it seemed as though they had been rubbed with sandpaper.

Almost all of the children wore their spectacles awry. One child who evidently had a myopia in excess of ten diopters was assuming the posture which we all know to be extremely detrimental. He was hunched over his desk with his head cocked. This was in a room where the teacher, I was told, was a new teacher, and when I drew her attention to these facts she seemed to be very grateful. That brings up the point that if we leave the posture of these children to the teacher who herself is not conversant with what good posture is and with the dangers of improper posture in relation to the development of myopia, we are not doing all we should for those children.

Another little child, I was told, had been provided with telescopic glasses by Dr. Gradle. She was not wearing them. She was wearing ordinary glasses.

In regard to compulsory glasses, our Boards of Education have insisted upon compulsory vaccination, a measure which has the support of all civilized countries. Here and there we have sporadic and, I am glad to say, usually ineffective attempts to do away with compulsory vaccination in the public schools.

The gentleman from Philadelphia, Dr. Cornell, mentioned the difficulty of compelling certain parents to secure glasses for their children. Is it not a part of the duty of the school to bring each pupil up to a physical standard that will enable that pupil to do his best work and with the highest degree of efficiency? If a child is handicapped by inefficient eyes due to uncorrected ametropia, is it not proper that the school should insist that that child wear properly fitted glasses or be debarred from school, just as in the case of compulsory vaccination the child who is not vaccinated is not permitted to come to school?

Surgeon Paul D. Mossman (United States Public Health Service, Rolla, Mo.): Several thoughts came to my mind while Dr. Wilder was discussing the importance of getting children properly refracted, and when Dr. Royer was reading Dr. Cornell's discussion on the difficulties that are experienced in getting these things done.

This work, of course, is largely done in large cities, while my present experience is with children in village and country schools. During our field work in examining for trachoma we find a great many children with obvious defects of vision. The parents or the teacher will ask, "Whom will you recommend?"

These people are one or two hundred miles away from Dr. John Green or anybody else who can give them a good job of refraction, and that is a very serious thing. These people we could persuade to have glasses fitted, but they are out of the geographical range of reputable eye men—they have been the victims of unscrupulous spectacle peddlers who go about the mountain country and who have an uncanny ability for finding that a family has fifteen dollars in the house and of getting $13.85 of it for an unsuitable pair of glasses.

The only other point that I want to mention is to pay tribute to the school teacher in the village and country. The school teachers are in schools where they have no medical inspection, but a great many of them are very attentive and very alert on this point of picking up disabling defects of vision. I have seen many of these children picked out by the teacher who has no special training other than her general reading and her intelligent interest.

Mrs. Little (Baltimore, Md.): I should like to ask Dr. Green in what way they examine the children in St. Louis. Where is the first examination given?

Dr. Green: I can't answer that for St. Louis. I live in a suburb of St. Louis, University City, and I am much more familiar with the situation there. The first examination is at the beginning of the third grade.

Miss Adeline Riefling (St. Louis, Mo.): All our kindergartners are located before entering the school and are now brought to the school doctor previous to their entrance and at that time optical as well as medical examination is made.

Chairman Gradle: Dr. Lucien Howe, recently of Buffalo, the Nestor of the American ophthalmologists.

Dr. Lucien Howe (Cambridge, Massachusetts): The presiding officer is very kind to ask me to say even a word. I have no suggestions to make, and only a word to say. It is that medical colleges must pay more attention to the teaching of physiologic optics. This is done already at a few of the better schools of optometry and the medical colleges should not allow themselves to be surpassed. It is possible to gain the confidence of the public only by more thorough education of the doctors, and if they are taught to practise ophthalmology at all, they should be taught to practise it well.

Mr. George F. Meyer (Supervisor of Sight-saving and Braille Classes, Minneapolis, Minnesota): There are two points growing out of what has been said, the second of which I hope may be more thoroughly discussed: First, the question of who is to support the health

activities; and second, how are we to examine the eyes of our school children? The first, the question of who is to support the clinics, is one which has been touched upon in these papers, and which, I believe, has come to be more or less of a problem in every large center. It arises primarily from the tendency on the part of the public to scrutinize more carefully the money granted to Boards of Education. The most casual examination of any metropolitan paper at the time when the Board of Education is considering its budget will convince any doubting Thomas.

Just before I left a paper came out with a statement that the Minneapolis Board of Education was getting 29 cents out of each dollar. That sounds like a lot to each taxpayer. Coupled with the increasing cost of education is a tendency to burden the school with everything imaginable. Not long ago a man of considerable attainment in the educational field suggested casually that the school ought to establish "nurseries" or similar centers for the care of the mentally deficient falling below an I. Q. of 50. This is a fair illustration of the constantly growing demands which are made upon the schools, and I believe that our educators have long felt that a line should be drawn wherever possible.

Mr. W. F. Webster, Superintendent of the Minneapolis Public Schools, in his last annual report, stated that in his opinion it is not the function of the Board of Education to do reparative work, though it should ferret out defects. Reparative work, he stated, is the function of the Health Department. He simply called the attention of the Board of Estimates and Taxation to the fact that the bill should be put where it belonged, not that it should not be taken care of, but that it should be paid for by the proper agency and that the proper agency should receive credit for it. As a result of this recommendation, the Dental Clinic in Minneapolis has been transferred to the Board of Health, though the Eye Clinic still remains under the Board of Education. It would seem reasonable that a project definitely affecting the health of the community should be administered by and paid from the budget of the Health Department.

But it is the second question which interests me even more than the first, namely, how are we to examine the eyes of our school children. The problem is baffling. When you consider the mounting costs of education, the increased demands on the school system, and the very high cost of the best type of medical service, which after all is necessary, the problem presented is one which truly deserves the attention of our best ophthalmologists.

One of our local doctors has recently been considering the plan of testing the eyes of school children in rather large groups, through a special mechanism designed for the purpose. I think that oculists have avoided such considerations because of the grave danger of misapplication, and further danger of the wrong conclusions being drawn from the results. In view of other tests, which are now being applied to groups of children, it would seem that such a plan might deserve careful consideration. It seems to me that we are coming to it some time, and surely the people who ought to be the first to

suggest such a plan and the people who ought to guide the investigations in its development, should be our most eminent authorities in the measurement of vision. The ophthalmologists would do well to conduct some researches in this direction tending to show that the plan has or has not merit. The results of such a test should be valuable, though perhaps not conclusive.

Dr. D. P. MacMillan (Director of Bureau of Child Study, Board of Education, Chicago): I don't want to allow this opportunity to pass by without spreading some word of commendation for the work of the Illinois Society for the Prevention of Blindness. In a public office, working with all sorts of physical and mental defects, it becomes a grave problem to the official to know how to take extra official organizations. Every kind of activity is inaugurated and conducted as a demonstration for public bodies. We have had some of the best institutions in the last twenty-five years introduced into the city public work by such demonstrations of different kinds of social, educational and physical activities.

When an organization undertakes to do a specific piece of demonstrative work, it is desirable to have it conducted in the very best way possible. I can think of no more conscientious and clear-cut work than that which has been done by the Illinois Society for the Prevention of Blindness in its relation to the work which I am conducting in the public schools. All your cases that are reported are automatically turned over for entrance to the special divisions for the blind and for those with very defective sight.

Moreover, I think Dr. Wilder's activities personally have been most excellent in advice and in practical work. I want to thank him for the clear-cut and unostentatious way in which he has presented the whole material. The practical assistance which the Society has rendered us day by day has been great. It is the best conducted extra-official organization that assists us.

It becomes difficult, sometimes, to know to which of all these organizations some special child shall be referred. For example, one came in this morning to me with a vision of 21/100, with cardiac lesions, with lung affection, and very defective hearing, 3/5 and 1/5 of normal. In such a child, markedly defective in his school advancement, it is a problem, necessarily. It is difficult, therefore, to determine which of the defects becomes the central one around which all the others become part processes, contributory or non-contributory to the cardinal defect which we are beginning to study.

Of course, every one has a mind, and we begin on the problem of defective mental work first. The others are contributory. Defects of vision are enormous handicaps but it should be added at this point that defective vision does not mean defective innate mental powers; it affects only rate of progress in attainments, except in one case which, by extension or contiguity, metastasizes to other divisions of the organism. Then the problem becomes one of determining simply the kind of defect which is potent and the kind of defect which is irrelevant to the problem you are studying. It is important to attack each problem in turn, and it is vitally important to attack

the problem of vision—grave defects attended to, medium deficiencies to be corrected and minor defects not neglected.

Moreover, I want to discuss the problem of differentiation of functions in this public work. Who shall conduct this work? You can clearly keep in mind one thing: First, that the matter of contagious diseases is usually under public health boards, for the reason that the end to be attained is protection. The work centering in physical defects and the correction thereof must necessarily be connected with another problem, namely, the promotion of the individual and procuring of the best opportunities for his advancement. Therefore, that problem primarily is an educational one.

Of course, some seventeen years ago, as you remember, that question was up for discussion, in an attempt to get all the work for physical examinations under Boards of Education and for contagious and infectious diseases under Board of Health.

The question of expense enters in. It is a very difficult thing to refer expense to a Board of Health with the expectation that they will be empowered to spend money for correctional work, or even for detectional work. The same problem will arise from the legal end as to the desirability of spending municipal funds for correction, whether it be done by Board of Health or by a Board of Education.

The next great step for this organization is to bring forward the conclusions that you have already made in your demonstrations, to make the illustration pertinent and telling, so that it can be brought to the attention of the Boards of Education that every provision possible shall be made for the correction of defects, and we are talking, in this connection, of correction of physical defects of vision.

Every effort should be made to correct defects of vision early in the child's school life, if possible, carrying over the pre-school examinations, and certainly making every examination possible in the first year or at early entrance into the school.

The matter of clinics for the correction of defects is at basis a legal question, and examinations for the correction of defects is an educational problem that you can promote, that you can emphasize at every opportunity, and that you can bring home to Boards of Education with very telling effects.

Dr. Edward Jackson (Denver, Colorado): While the subject has been very completely presented, it has not been brought out in the discussion that the correction of visual defects is an educational measure. There is an educational responsibility. The school board has authority to put up buildings, shelters; it is its duty to see that the schoolrooms are well fitted, it is its duty to see that they are well ventilated. It is also its duty to have the school so organized that the scholars shall not be promoted from grade to grade until they are fit for the promotion and can profit by the opportunities that are offered them in the new grade.

I believe it is equally a duty that lies peculiarly on public school authorities, to provide that all children shall be able to profit by the methods of instruction that are in common use for other children of the locality. One of the necessities for profiting by our present

methods of instruction is a certain amount of vision. It seems a perfectly rational requirement that at entrance, and from year to year afterward, the school board should provide for ways of finding out that each particular child is ready to profit by instruction it will receive. That includes the examination of vision.

In Denver we have schools for undernourished children where lunch is served, or milk is served in the morning. We have open-air schools to provide for particular children. I can see no argument that can be used for any provision of that kind that cannot be used for providing glasses, if they are needed, for children who should be in school, who are better in school than anywhere else, who cannot profit by the opportunities that we are offering to all children of school age, unless they have glasses.

If school boards are approached from this line of attack and made to see the implications of poor vision in every part of our present school system,—every step in the process,—if they are at all worthy of the trust that we place in them to conduct schools, they will understand the necessity of taking this step; which has been illustrated perfectly as practical in Philadelphia, Boston, and many other places. It is outside the traditions of fifty years ago with reference to the public school, and there are a certain number of minds in the community that are not prepared to go outside of their traditions to hunt up and weigh new ideas. So that idea must be placed on the most direct and practical line of thought, before they will appreciate that they have any interest or duty in that direction.

Dr. William F. Snow (American Social Hygiene Association, New York City): If it is pertinent, I should like to ask a question of one of the delegates. I was recently in Kansas City and heard a discussion of the Children's Bureau, they call it, which began a few years ago for the study of high infant mortality there and deaths among the children of pre-school age. They made something over 26,000 visits or studies of homes, and in that connection (they were studying a particular problem) they came up against a great many of these eye defects. The delegate from St. Louis mentioned the pre-school examination. I should like to know in a few words how they have approached the machinery of pre-school examinations on this kind of problem. Their experience in Kansas City apparently has led them to feel that a great deal of advantage occurs in getting directly in touch with parents about these problems.

Miss Riefling: The problem was approached in this way. They asked the school to send to the office of the principal the names of all pupils that they knew were likely to enter in the coming term. The school nurse was given the names and she got in contact with the people in her medical district. The children were brought by the parents. I saw them coming with the parents all through the summer at the summer school where I was teaching. The doctor and the nurse and the parent and the child were in conference, and the examination was made there. I am glad to have this opportunity to correct what might have been a wrong idea. I don't

believe they make a very adequate visual examination at this time. Of course, they do for strabismus or cataract or something like that that the mother might have noticed in comparison with the other members of the family, but for a real ocular examination I don't know whether that is being made. The children are brought with the parent after being located in that fashion. Whether or not the survey is complete by the time the kindergarten opens, it is rather doubtful to say. However, I suppose other cases can be cared for where both of them could not be cared for if the previous investigation wasn't made.

CHAIRMAN GRADLE: May your Chairman offer a suggestion for your thought, that possibly examination of the eyes of school children can be aided by the instruction in the departments of pedagogy of the different universities and in the normal schools of the coming teachers as to methods of taking vision? For the immediate future, of course, that would be of no significance, but for the teachers of from ten to fifteen years from now in the rural communities, at least something could be done along that line.

If there is no further discussion, I will ask Dr. Wilder to close.

DR. WILDER: I am very grateful to the audience for their consideration of this presentation of the work of the Illinois Society in the past years. I want to comment on one or two of the remarks that have been made. I am pleased to hear what Mr. Meyer said in regard to the authority of the health board and the authority of the board of education, particularly in regard to the divergence of opinion as to whom this function or authority of examinations and defects belongs.

I am inclined to agree with Dr. MacMillan, who I think has presented the subject very well, as he usually does, and I feel that here we have a problem which is educational rather than sanitary. He makes the distinction, as you have heard, that the health department concerns itself with those diseases particularly that may spread from one person to another. Their problem is frequently one that is concerned with contagions, whereas the Board of Education is concerned with those conditions that affect the individual and which may influence his progress through the schools or interfere with his receptivity of teaching that is to be provided. So we might debate for some time as to whom this function belongs of examining for and discovering defects, and then if possible remedying them. We must endeavor to place this authority somewhere, and where it seems the most sensible place to put it.

The health authorities in our cities are providing physicians who are educated in matters of general health and in general pathology, but it is rare to find one of these physicians who is educated as a specialist in the eye and who is even capable of making a most superficial ophthalmic examination.

So my argument is that we must have specially trained men to make these examinations to discover certain defects of the eyes and determine whether or not they are remediable. Physicians know

that a man must have the special training of an ophthalmologist to discover such things as retinitis pigmentosa or degenerative conditions of the inner coats of the eye, or congenital cataracts. When it comes to making special examinations of refraction, he certainly must have technical training as an ophthalmologist.

We have to place in a group of special examiners this authority of making special tests. Whether this work is to be done by boards of health or by the board of education through specialists they appoint is all one, but it seems to me the logical place for it is with the boards of education, because they are particularly concerned and interested in whether or not the pupil assigned to them for instruction is capable of taking on that instruction and capable of proceeding with it. Then what more logical than that they should spend a little more money and treat those individuals who cannot afford to have private treatment? You can't force this on the people. That is in defiance of our fundamental laws. You cannot say to an individual, "Tommy, you must be vaccinated," but you can say to him, "If you are not vaccinated, you cannot attend school." We can restrict him in that way. We cannot force him to wear glasses, but can have the school, through its clinics, examine him, and if it is found necessary for him to wear glasses then we shall expect him to do so after a satisfactory demonstration of their value.

It all simmers down to the point of whether we can empower Boards of Education to carry on work of this kind which seems so distinctly different from that done by boards of education twenty-five or fifty years ago. It seems to be entirely out of their province. With the advance in modern knowledge and with the advance in methods, it seems to me it is quite in accord with such advance to empower boards of education to do work of this kind.

Section V

Prevention of Blindness from the Standpoint of the Ophthalmologist

Robert H. Buck, M.D., *Chairman*

Chicago Ophthalmological Society
Illinois Society for the Prevention of Blindness
National Committee for the Prevention of Blindness

Prevention of Blindness From the Standpoint of the Ophthalmologist

Robert H. Buck, M.D., Chairman

Chairman Buck: This meeting is being held in conjunction with the Illinois Society for the Prevention of Blindness. Dr. Wilder is the representative of that organization, being the Vice-President, and being a confrère of Dr. Jackson, it is especially appropriate that I ask him to make a few introductory remarks.

Dr. William H. Wilder (Rush Medical College, Chicago, Illinois): I assure you this is a very pleasant occasion for the Illinois Society for the Prevention of Blindness and also for the Chicago Ophthalmological Society. We feel ourselves highly honored in having this opportunity to welcome such an assemblage here and such a large representation from the National Committee for the Prevention of Blindness, which, as you know, stands for such high ideals.

This national organization is wielding a very large influence throughout the country, not only in assisting in the development of societies such as we have in this state, but also in arousing sentiment and public opinion in regard to this most important subject of conservation of vision.

No one in our medical profession or in society at large has a wider range of knowledge in regard to the whole subject than the speaker of the evening. No one enjoys higher esteem and regard in his profession than the gentleman to whom we are to have the pleasure of listening tonight. Therefore, I can assure you words of wisdom when you listen to him. I fancy you will all agree with me that the evening was well spent.

Without any further introduction I present the speaker of the evening, who will address us on the subject, "The Prevention of Blindness from the Standpoint of the Ophthalmologist"—Dr. Edward Jackson of Denver.

Ophthalmology in Relation to Prevention of Blindness

Edward Jackson, M.D.
Denver, Colorado

I suppose the story of Samson and his undoing, and the consequences of having his eyes put out, was appreciated from the time it was first told, or written, and has been appreciated wherever it has been heard or read. Within historic and prehistoric time, as far as we can trace it, there have never been human beings living in any considerable number, or with wide contacts, who did not understand the calamity of blindness. The Greeks did not agree where Homer was born, they did not agree whether he lived 800 or 1200 B. C., but they all agreed that he was the Blind Poet of Greece.

When the "Book of the Dead," the Ebers Papyrus, was written, the part on the eye was by a specialist who had lived in Cyprus. He wrote the oldest account of ophthalmology that has yet come to our knowledge. About the same time, 3,500 years or more ago, the code of Hammurabi, unearthed at Nineveh, told of the penalty for causing blindness, or for blindness ensuing on treatment. That goes back farther than anything else that we at present know as ophthalmology.

Tracing the history from the earliest time that we can recognize it, up to the present day, blindness has fixed the attention of people upon the function of the eye, the dangers to the eye and the importance of means to guard against those dangers; to preserve the most important sense that human beings are blessed with. It is unnecessary to trace in detail what has been the development of ophthalmology. But at many points it has been clearly the reaction of human intelligence and human sympathy and desire to the calamity of blindness.

The history of ophthalmology has advanced from the early development and treatment of the ophthalmias, from the treatment of cataract, attempted and done with more or less success in India, probably for 5,000 years or longer to the treatment of the serious conditions that attracted the attention of the Greeks. The whole

history of ophthalmology brings us, again and again, in contact with the problem of blindness, or the problems that spring out of blindness, for there are many of them. Trachoma, which we are to have discussed tomorrow, was evidently one of the most distinctly recognized diseases of ancient Egypt, and we still have it in our catalogue of important causes of blindness.

The Greeks recognized strabismus, but it is notable that nothing was done for the treatment of strabismus, until the era when it was found that the squinting eye had poor sight and that strabismus in many cases was responsible for the poor sight. Today the argument of the importance of saving the sight of the eye, making it as useful as possible, giving it the best chance for development, is the strongest argument that we have to urge for the operative treatment of strabismus. Strabismus was recognized, of course, by Hippocrates, but confused with the spasms that attended disease of the central nervous system.

When modern ophthalmology had its birth seventy-five years ago in the use of the ophthalmoscope, one of its first important applications was for the discrimination between the cataract and the diseases causing blindness that had been confused with it, particularly, as we know now, glaucoma, atrophy of the optic nerve and lesions of the retina. The end is not yet. We have seen the application of biomicroscopy, and much interest has been aroused in this new application of the microscope to the living eye, because of the light it seems likely to throw on pathological processes that still lead to blindness.

When Professor Koeppe was with us in Denver, the thing that struck us with most interest was what he called the nodules in the iris; that, as he taught, showed either syphilis, tuberculosis, or sympathetic ophthalmia. We do not all agree that that is the case, but the fact that these were given as an evidence of diseases that are marked by great danger of blindness, surely added to the interest of his demonstration.

The time has come when the old order of attack in medicine is giving place to the new. The management of active, particularly of acute, disease, the operations to remove disease, are giving way to the prevention of such conditions. As our progress extends further, as we see farther ahead in the prognosis of any case of disease of the eye, it is perfectly natural, it is the only logical thing that is possible, that we should pay more and more attention to prevention. Blindness has made its impression on the general consciousness of the community in civilized nations, arousing sympathy, awakening the

desire to help in all sorts of people and in all possible ways; and responding to the same influence the medical profession, I believe, is passing over more and more into the prevention of blindness.

Ophthalmology so closely intertwines with the history of our knowledge of blindness in the past, we should see in this present stage the outlook for the prevention of blindness. How wide that opportunity is can only be appreciated by reflecting on the problems that today are current in the prevention of blindness. Take your own program here and read it over item by item: "Bacterial Invasion: A Menace to the Newborn." The bacteriology of ophthalmology is just opening up. The past few years have seen a new light thrown upon it by the work of Lindner who started with regard to trachoma, and went over into the other conjunctival infections. Then, there is the topic, "The State's Function in Promoting Prophylaxis in the Newborn's Eyes." We heard a very interesting account of the first assumption of that function yesterday; from at least one of the men who said he was not the only one who was active in bringing forward the prevention of ophthalmia neonatorum to a place in recognized laws, to a place in recognized public policy with reference to public health; and opening up in other directions the eyes of the seeing to the necessity for the prevention of blindness. Then, there are the papers: "Syphilitic Eye Tragedies and Their Prevention," and the "Early Treatment in Relation to Eye Tragedies." Can any ophthalmologist read that program and not feel that everyone of these subjects opens up great fields for advance and development in ophthalmology, in practical ophthalmology, in the treatment of ophthalmic disease?

Then, we come down to the afternoon program. We have new light thrown on the development of the eye and all the relations of that development to sight, by the talk given before the Illuminating Engineers yesterday afternoon. The title might have been something more pretentious, apparently more scientific, but if we get the good out of that, that is suggested, "How We Learn to See and How We Learn Some Other Things," we probably have counted it as one among our most profitable hours.

Following that is, "The Intensity of Light, of Speed and Vision, Studied with Reference to Industrial Situations." Then comes "The Four Mental Factors in Seeing," which I think struck most of the ophthalmologists that were there, as new. It is a new point of view for us to consider the active sight.

This morning, we dealt with the prevention of industrial eye injuries. That is as practical as any subject that can ever be brought

to our attention; we feel it, we come in contact with it in everyday practice.

Going to this afternoon, there was opened up a line of work for the prevention of blindness that is really in the center of the field, and in which ophthalmology must lead if advance is to be made in that direction. That problem is, the care of the eyes of school children, the detection of defects, the importance of giving the child, perhaps with minor defects, a fair chance to use his eyes, and succeed in this civilization which rests on vision. All that, if it is to be a healthy development, must be guided by the knowledge of those who have studied ophthalmology, who are more interested in it than in anything else, and who are ready to help the public to find themselves in their efforts of sympathy to prevent blindness.

The same is true of tomorrow, the morning is to be given over to the sight-saving classes, introducing a different aspect of this same problem of protecting the eyes of the young, of helping those who have not a fair start to overcome the handicaps that were laid upon them and take their part in life; and then, again, after a luncheon conference on that subject, we come back to the old problem of Egypt, the trachoma problem, which is very much the same problem for us as it was in the days of 1500 B. C., when they sent for a specialist from Cyprus to write on it.

Then consider the subjects that are before us, all with reference to their bearing on the prevention of blindness. We have had a wonderful advance in the last fifty years with reference to the treatment of injuries, with reference to the understanding of the causes of inflammation following trauma, in many respects in the control of the treatment and the control of the results of such injuries.

Who is there who is familiar with the ophthalmology of today who does not feel that instead of having achieved the goal, we are just starting toward it and perhaps getting a glimpse of the pathway that goes in the right direction. Our knowledge of infection, based on our knowledge of bacteria, and based also on the observance of symptoms by the most exact methods, is preparing us to treat injuries and the results of injuries better than they have been treated heretofore. You who are in ophthalmology know that blindness which comes from injuries depends half the time, at least, upon the sequels to the injury, upon the infections, and at every step the course of the case presents the problems of therapeutics. Improvement of all ophthalmic therapeutics must go on, if we are to do a proper share in the work of preventing blindness. So much for this radical connection between ophthalmology and blindness and its prevention.

We heard yesterday some statistics drawn from very carefully observed cases in school. There were references to congenital blindness and the blindness from ophthalmia neonatorum, and the blindness due to inherited syphilis. The papers and the discussion showed clearly that those were important subjects and are still very important subjects, but they are not the most important, they are not the broadest subjects that we have to deal with.

The number of blind under one year of age in the community is set at one-tenth of one per cent, under five years of age one per cent, of all the blind in the community. These come from the statistics of 1910 for the United States, that were rather carefully compiled. However, they, like most statistics, have the characteristic of having some facts left out; but they are the best we can get.

There are 3.9 per cent of the hundred per cent of people at twenty years of age, who have become blind. At forty years of age, 4.4 per cent; at sixty years of age, 6.5 per cent; at eighty years of age, 8.9 per cent. It is difficult, though, to get the significance of those figures in that shape if we take the number of blind in a million persons at those different ages; remember that throughout life the number at any particular age is declining. The mass statistics with reference to blindness show that rather over one-half of the blind in a community are over sixty years of age.

Under one year of age there are thirty-two blind for each million of population; under five years of age, fifty-two per million. At twenty years of age it has risen to 243 per million; at forty years of age, 396 per million; sixty years of age, 1,326; at eighty years of age, 4,589, and over eighty-five, it is in the proportion of 25,748 to the million of blind people. The falling number of population and the rising percentage of blindness, become very impressive when you put them that way.

The average age of the general population is set down at twenty-four years. The average age of the blind is 59.6 years. Sight is lost in the great mass of cases through attacks of disease, by transgression of the laws of health throughout life. Blindness is the summing up of what has gone before, and when that fact is fully recognized by the ophthalmologist, it must carry with it a great sense of responsibility.

Perhaps the interstitial keratitis that was alluded to yesterday, or the scars of phlyctenular keratitis, frequently by the degenerating processes of nutrition in later life, become more and more obtrusive and serious. I have seen where there was a clear history of phlyctenular keratitis in childhood, scars in the cornea that were

scarcely noticeable up to sixty years of age, become very marked, and be as much a cause of senile blindness or impairment of vision as cataract is in the average case.

There are probably other lesions acquired early in life, that pass through similar stages, but become of practical importance only many years after they occurred and often after they have been forgotten.

Glaucoma is often inherited. Liability to cataract is inherited. The danger is a congenital characteristic of the particular individual, and yet these things only develop. We only become conscious of them in the latter part of life.

Optic atrophy, as illustrated in the discussion yesterday, may rest on a cause many, many years back, with no manifestation until the changes of age begin to slow down nutrition and lessen the power of repair, until we have complete blindness from atrophy of the optic nerve.

Until 125 years ago smallpox was one of the common causes of blindness throughout the civilized world. It is still a cause of perhaps eight to twelve per cent of blindness in some countries which have pretty good statistics on the subject, but which do not have enforced vaccination.

In Colorado we have quite a large Mexican population in the southern part of the state, and from them where vaccination is often omitted, we get today a certain number of cases of blindness from smallpox. I think it is probable that there are between fifty and one hundred such cases in the state now. One of the most striking cases that I have ever encountered, I saw when I went on duty at Denver General Hospital several years ago. An old woman was very anxious to see me, I was told. She had come in during the three months of my predecessor's service. In the three months that I was on duty I never went to the hospital that she was not anxious for me to see her, and see if something could not be done for her sight. The history was that she was seventy-five years old and had never been vaccinated. She took smallpox, both of her eyes suppurated, and sight was entirely lost.

That sort of case occurs so unusually now that in order to get the full benefit of it and to do justice to the age in which we live, it must be emphasized. But those seventy-five years, when immunity could have been had at any time, and the danger avoided, had passed without it. How many other cases of blindness do we encounter when the same long period, or a very long period has passed; when a careful study of the case would have shown dangers to be

avoided, and in the end the omission of such a study resulted in the blindness of old age?

A few years ago I had occasion to go over several hundred cases of cataract in their early stages—those which had been under observation for several years, I think from five to twenty years. My conclusion from the history of those cases was that on the average it was about twenty years from the time that symptoms of cataract are clearly detected in the eye, changes in the lens, limited opacities, up to the time of blindness from cataract.

There are constantly, perhaps, seventy-five per cent of the people who are over seventy years of age, in every community, that have had some start of cataract, and yet they need not, in the great mass of cases ever come to the issue of an operation, or blindness. Most of these cases depend on causes that can be detected and removed. One of them is eyestrain. That is a very common cause. The lack of appreciation of the importance of eyestrain is responsible for a certain number of cataracts.

I have frequently noticed people, who came unusually late for glasses, perhaps fifty years, or even older, before they would wear glasses for near work, who have signs of cataract; and then, after the wearing of glasses and care of their eyes, the evidence of cataract never increased, or increased so slowly that the patients went on five, ten or fifteen years after it was detected, and never were seriously inconvenienced by the change in their eyes.

I mention these things because in our daily practice we are coming in contact with very large numbers of people who are possible subjects of future blindness. In fact, the mere theory of probabilities would show that a large number of them will become blind sometime, and they will become blind from accumulated damages to their eyes that might have been avoided, or the consequences largely escaped. Does that not place upon everyone, who undertakes to advise with reference to the care of and treatment of the eyes an enormous responsibility for the future prevention of blindness?

This matter of eyestrain suggests one common following after false gods, of which we are guilty in common with other branches of the medical profession. We attach importance to operations and their immediate visible results, rather than say, to giving the patient the right glasses so as to avoid eyestrain.

A few years ago I had a patient who had advancing cataract, but had been able to use his eyes and keep on with his business, by keeping his pupils somewhat dilated. Then he told me he was going

to Europe and wanted to consult some famous ophthalmologist there. I gave him the name of one. I did not see him for a couple of years afterward. He went to one of the famous operators in the world, and had the cataract removed. He did not entirely like the way he was treated there, so the next year he went to another very famous operator in Europe and had the other cataract removed. I saw him about a year and a half after he came back. He was dissatisfied. He had beautiful results of cataract extraction. The extractions were done with the iridectomy, the good old-fashioned operation, and capsulotomy, and they were as beautiful as I ever saw. But his vision was only one-third, and he had had exceptionally good vision before he contracted the cataract, and he was not entirely satisfied with the result. He came back to me. The fact was that he had been given glasses only a few weeks after the operation. Probably they were given with the idea that they would be changed subsequently, but the glasses had given him one-third vision. His beautiful extraction and the correction of his astigmatism gave him 1.3 vision. That raise from .3 to 1.3 was just as valuable to him as to anybody.

A woman, who had applied for a blind benefit in Colorado, had been advised to have her cataracts removed. She went to one excellent ophthalmic surgeon and had one cataract removed. The eye became infected and was lost. Still the temporary improvement of vision induced her to go to another surgeon, also of large experience and great skill. He removed the other cataract, and this time the result was more fortunate, there was no serious infection. But both of these surgeons were ready to operate for cataract, for this patient who could pay nothing for it. But after the cataract had been removed, it was a somewhat difficult case for which to get the right glasses and the surgeon who had been so successful in the operation "could not do anything more for her sight." He felt it was not worth while to try to fit glasses. Therefore she was sent out with a vision of 1/10, enough to go about, with the glasses that she had. The correction of her astigmatism gave her between 4/10 and 5/10 vision, enough to do ordinary reading. It raised her from the level of the practically blind, to fairly good vision. Her gratitude for that improvement in vision was as great as any person ever felt for a good cataract operation.

The thing that I am getting at is that we must be turned away from the spectacular things in the practice of ophthalmology, to the watching of minute details and perhaps to the watching of cases over long periods, and the care of little things, which if properly

attended to in the earlier years of life, will prevent the life from ending in blindness. That is the important lesson that blindness has still to thrust upon us, to bring it to our attention, to enforce our interest in it; and in that way to develop ophthalmology to a new efficiency, one that will really make blindness rare and rather a thing of historical interest.

There are other things I have not mentioned—myopia and retinal detachment. The cases of myopia that go on from bad to worse are, in my experience, cases of neglected refraction. They may sometimes have gone so far at an early age that glasses alone will not be sufficient, but the myope school, the school adapted to defective sight and the eyes that cannot stand the average strain, must assist them. But cataract and detachment of the retina belonging to late myopia are as preventable as any other form of blindness, or any other form of serious disease. Prevention depends only on close watching and long care to avoid them.

There are many varied elements in glaucoma and it has a bad reputation. We have had a great deal of reason to feel hopeless about cases of glaucoma; and when they are recognized we are glad if they will go to somebody else. But there are cases which show that glaucoma can be permanently controlled and cured. I have in mind a patient, who came with one eye blind from glaucoma, the other with attacks of acute glaucoma that had been going on for considerable time. The blind eye finally was operated on for hemorrhagic glaucoma. That patient had been going perhaps twenty years after the age of presbyopia with a high hyperopia, and perfectly inadequate glasses, and yet trying to keep on using her eyes for sewing and for reading. When the issue was forced, by her blindness in one eye, one of the things that was immediately done was to give her the right correction; and the removal of strain that her eyes had been under checked the glaucoma in the other eye. First, we used miotics, but after that, we stopped them entirely, and she lived several years without any renewal of glaucomatous symptoms and without any operation on the surviving eye.

There are many elements, some of the most important of which we do not yet understand, in the problem of glaucoma, but the things that we have learned about looking ahead to prevention teach us to expect great gains in this particular disease. Other sources of glaucoma are the untreated or poorly treated inflammations of the uveal tract. Every inflammation of the uveal tract raises the responsibility of possible blindness, whether it is from syphilis, tuberculosis, or from focal infection of some kind. We are only just begin-

ning to know the causes that lie back of such inflammations, and to look to them to see our opportunity for prevention of the sequels.

A great many of the cases of damage to the eyes in early life are connected with the acute dangers of contagious diseases: measles, occasionally mumps, chickenpox, scarlet fever. Measles, scarlet fever and spinal meningitis have particularly bad reputations in that direction; but they raise the importance of the proper treatment of those cases at the time they are acute; and the final result will depend on the wisdom and persistence of that treatment, not only by ophthalmologists, but by general physicians.

Tumors, parasites, senile degenerations, tuberculosis, are conditions which run a course of years; and all likely to end in blindness, some in death. The early recognition, the early diagnosis, the willingness to take the responsibility of foresight and apply effective measures now rather than wait, which too many of us are slow to assume, would prevent blindness. That is the direction for the future development of ophthalmology,—that, and conscientious thoroughness in what we do undertake to do, and the willingness to follow up and learn from ultimate results the new lessons that they can teach.

Discussion

CHAIRMAN BUCK: I think that the suggestion of Dr. Jackson with regard to throwing this open for general discussion is excellent, and I would like to ask for volunteers.

DR. H. W. WOODRUFF (Chicago, Illinois): I have been very much interested in Dr. Jackson's remarks. I think I have learned something; I think perhaps my patients may profit by my being here tonight.

I had just one thought, that ophthalmologists alone perhaps are not to assume full responsibility. Dr. Jackson just mentioned inflammations of the uveal tract as causes of blindness. We are all painfully familiar with that fact, and we have perhaps failed in securing or in insisting on co-operation.

Dr. Brown here is particularly familiar with that on account of his investigations, and Dr. Irons, no doubt, has found it in his study as to the cause of iritis. It is so difficult, though fortunately becoming less so, to get co-operation, for instance, with the dentist. It is common knowledge now that the teeth are frequently the cause of serious attacks of iritis, that you are dependent upon the co-operation of the dentist who recognizes this feature of it. Of course, the dentist is still very apt to look at the tooth simply as a tooth. If we can have the complete co-operation of the dentist, we can save many of those eyes. This holds true for the internist, as well. In other words, we have to have a co-operation in the prevention of some of the diseases of the eye.

DR. WILDER: I should like to mention that I was particularly impressed by two points that the speaker brought out, and they are the points with regard to myopia and with regard to cataract. In the first place, it seems to me that for some reason or other I am seeing very much more myopia than I used to see twenty-five or thirty years ago, and I don't think I am doing any more work than I did at that time. I am certainly observing in my practice, both public and private, more myopia than I saw at that time. I don't know whether others have had a similar experience, but I have spoken to some who have made the same observation. For some reason, either because of the difference in the character of the population or the difference in the school requirements there seems to be an increase of this condition. Possibly the extensive training to which the children are now subjected in the schools, and the more exacting curriculum may have something to do with its development.

I was impressed by what the essayist said in regard to the subject, because it seems to me from the experience I have had in the last thirty-five years or so, that if there is anything that the ophthalmologist can help to control in his work as a practitioner of ophthalmology, it is the increase of myopia in very many of the cases, by a careful and painstaking examination of the refraction, the use of proper glasses, watching of the case from year to year, and proper instructions to the patients in regard to use of the eyes.

It seems to me that here is a field in which we can show just what the essayist has emphasized and insisted upon, namely, a conscientious thoroughness in the study of the case and enough interest in it to arouse the patient himself and those near him to a realization of the great importance of having the case watched, particularly through the adolescent years.

Other facts that impressed me in Dr. Jackson's remarks were those in regard to cataract. We ophthalmologists see a great many cases of cataract; and we see them in all stages. Possibly we are not quite careful enough to follow such patients through the years, or to instruct them in the nature of cataract and the importance of having the refraction properly corrected.

How frequently we find that we may benefit cases of incipient cataract if we carefully go over the refraction. We can frequently improve the vision, and so increase the patient's comfort. Every one of us has had that experience. And how frequently it happens that a change in the structure of the crystalline lens alters the refractive condition and makes new glasses necessary. Too frequently in the rush of work we pass over these things rather slightingly.

As the essayist has stated, so many people carry on through life with an incipient cataract that may never seriously affect their useful vision, provided they can have the assistance which we can render them by careful attention to the refraction.

QUESTION: I should like to ask why there is so much glaucoma among the young now. It used to be considered an old person's blindness.

DR. JACKSON: Most cases of glaucoma are recognized early in these days. There are considerable numbers of cases of glaucoma that get well and stay well. I have two in mind that I have been watching for about eight to twelve years, of relatively young women who certainly had glaucoma.

One of them came to me with an iridectomy that had been done on one eye by one of the best ophthalmic surgeons in New York. Using her eserin treatment, she seemed to be doing so well that I advised her to wait before she had any operation done on her second eye. Presently the tendency to glaucoma apparently subsided. She finally stopped using the miotics altogether, and afterwards took a trip to the other side of the world. She carried a little bottle of eserin and the prescription with her so she could get it. But she never had to use it. That was fully five years ago and she has had no trouble since. She has normal central vision, although the field is still somewhat limited. There are cases of recognized glaucoma that formerly escaped detection. I doubt very much from my own observation whether glaucoma is really more common than it used to be.

With reference to the remarks of Dr. Woodruff, I hadn't any idea of claiming for ophthalmologists the whole responsibility for the prevention, or failure to prevent blindness. That responsibility must be divided in order to be properly met, divided with other branches of the medical profession, and perhaps by education still more divided with our clients. The public in general must be educated on the importance of tending to the little things of today, in order to avoid the possibility of blindness in the future. That perhaps is the largest thing that we have to do toward the prevention of blindness. I don't know anybody except those who are interested in ophthalmology and understand ophthalmology, who can give that education. Perhaps in that direction lies our greatest responsibility for the future prevention of blindness.

The question of myopia, which Dr. Wilder has referred to, is really just that kind of a question. But the underlying thought that I had with reference to this whole subject was this: One of the old English writers left a sentence, "Our motive power is found in what we lack," and the need for the prevention of blindness offers the incentive for the development of ophthalmology.

Section VI*

I. Sight-Saving Classes—Their Rôle in Conservation of Vision

MRS. WINIFRED HATHAWAY, *Chairman*

II. Luncheon Conference.—Medical and Pedagogical Administration of Sight-Saving Classes

E. V. L. BROWN, M.D., *Chairman*

*This Section is published separately as an issue of the *Sight-Saving Class Exchange*, No. 17, December, 1927, and can be secured from the National Society for the Prevention of Blindness upon request.

Section VII

Trachoma as a Public Health Problem

B. Franklin Royer, M.D.
William H. Wilder, M.D. } *Chairmen*

State and Provincial Health Authorities of North America

National Committee for the Prevention of Blindness

Trachoma as a Public Health Problem

B. Franklin Royer, M.D., William H. Wilder, M.D., Chairmen

Chairman Royer: A great many folks in arranging a tasty bit to eat, arrange to keep back the best morsel to the very last so they may always have a taste of it in their mouths. In arranging this program for the National Committee for the Prevention of Blindness, it occurred to us that it would be very nice to have the best program on the afternoon of the last day.

We had another object in mind, however. I am not going to lie to you about it. We wanted State Health Officers to have the privilege of attending this meeting en route to Cincinnati where the American Public Health Association convenes on next Monday.

There is a very important committee in North America known as the Committee for the Conservation of Vision, a committee that went somewhat into a decline a couple of years ago but it was revived, and they have been working during the last two years. The chairman of that Committee, Dr. Cogswell, is here and another member of that Committee is also here, Dr. McCormick of Kentucky, where they have no trachoma at all. I am sure you are going to have things of real moment discussed.

But, best of all, you have as a chairman of this meeting one of the fathers of the trachoma movement in this country. He has been with the Illinois Infirmary for years and been down in the Kentucky region, but during all these years he has not only been in touch with the cases here in his capacity of ophthalmologist but he has been down through the Kentucky mountains, he has been traveling diagonally through the sections of Oklahoma, and in Louisville he had a great deal to do with trachoma as it came before him in the drafted men.

Dr. Wilder is going to preside this afternoon and I have asked him if he would not be good enough to spend about three minutes in the beginning to put before you just the probable effect of trachoma and a little graphic picture, so that you would know something about what trachoma is and where it is.

Chairman Wilder: The subject of trachoma is an interesting one not only to the physician and to the public health official, but it is

of vital importance to the community at large. It may not be out of place for the benefit of those who are unacquainted with it, to describe briefly some of the pathologic features and significance of this disease.

Trachoma is a disease of the conjunctiva of the eyelids primarily, frequently extending to the eyeball. It is supposed to be contagious, that is to say, it may be conveyed from one eye to another, through the virus that exists in the mucus that is naturally secreted by the conjunctiva. Almost everyone knows, or should know, that the eyelids are lined with a smooth mucous membrane called the conjunctiva, not unlike that which lines the mouth, the nose and the respiratory passages, whose function is to secrete the slimy mucus in a certain amount so as to keep the lids perfectly smooth that we may not feel the motion of the eyes in the winking act. If we get the finest foreign particle beneath the lids we are aware of it at once because with the winking act it is rubbed over the sensitive cornea and causes pain. That illustrates how closely apposed the under surface of the lid is to the curvature of the eyeball and the curvature of the cornea.

Ordinarily, we don't feel the eyelids moving over the eyeball because the conjunctiva is smooth and kept moist by the tears and the mucus that is secreted by this lining membrane and our winking is unconsciously done. But let that membrane become slightly reddened or slightly swollen and then it is thrown into little folds that roughen its surface and we at once proceed to have discomfort or pain. Everyone here has possibly had an attack of slight hyperemia or beginning inflammation of the conjunctiva with roughness of the lids, characterized by burning sensations, roughness, or a feeling of sticks or sand in the eye, as people express it.

When the conjunctiva becomes inflamed, it may be serious to the eyeball because the inflammation may extend over onto the structures of the eyeball, the most important of which, optically considered, is the cornea, that watch-crystal-like structure in the front of the eye over the iris. If anything should affect that so as to cause it to lose its transparency, vision would become impaired.

In this peculiar trachoma the conjunctiva which lines the lids and which also overfolds on the surface of the eyeball, becomes inflamed and little bodies develop in it, the so-called trachoma bodies, or follicles, which can be easily perceived. One feature of the disease which is characteristic and makes it important to us is its insidiousness. It is very apt to come on not preceded by any previous inflammation of the conjunctiva and the patient may harbor the disease

for months before suffering enough discomfort to cause him to consult the physician, and it is this very insidiousness that makes it really a dangerous thing because if it could be discovered and properly treated in its early stages a very large number of cases could be promptly checked.

These little trachoma bodies that develop in the conjunctiva are at first not larger than very small grains of millet seed, but they increase in numbers and size and sometimes coalesce, so as to form large masses so that when the disease has reached a stage where it is of any moment or where it becomes serious, and the lid is turned over, these large masses are easily recognized. They are called trachoma follicles or granules. Not all cases of inflammation of the conjunctiva having these little follicular masses in them are trachoma. Occasionally follicles are seen in the conjunctiva that are not trachomatous but are benign in character, and sometimes it is quite difficult even for the expert to differentiate between this benign follicular condition of the conjunctiva and the more serious one of genuine trachoma. This must be borne in mind in considering the prevalence of a disease, which, like trachoma, is very extensively distributed throughout the world.

As to its prevalence, it has been known for centuries. It has probably existed in the Valley of the Nile, as was remarked by Dr. Jackson last evening, from earliest times and there are certain sections of the world where it seems to be more prevalent than others. We think it is quite prevalent in Egypt, where if one travels around he sees about every third person among the peasant class suffering from it, with ill consequences. It is very prevalent in China and in the eastern European countries. It is seen very extensively on the Scandinavian Peninsula, and also in certain sections of our country, notably some of the mountain sections of Kentucky, Tennessee, the southern part of the State of Illinois and in Missouri and also among our American Indian population.

Whether the disease as it is found among our American Indians, for example, or among our native population in America is one and the same disease as that prevalent in Egypt and other countries of the East is still open to demonstration. That is a rather important point that is being taken into consideration by Dr. Noguchi in his work on the subject. Trachoma is very extensive and because of its insidiousness and because of its liability to extend from one to the other by means of contagion carried by dirty fingers, soiled cloths, towels or handkerchiefs, or something of that kind, it furnishes a real health problem. Why does it furnish such a real health problem?

We would say it can not do anything more than produce the discomfort of an inflammation of the eyelids. Well, this inflammation, if it continues long enough, is likely to extend over to the eyeball itself and, attacking the clear cornea, cause new vessels and opacities and even ulceration; and when that heals, a dense white scar of the cornea will result so that blindness occurs very frequently in neglected cases.

I will not encroach further on your time but in introducing the first speaker on the program it might be well to state that this meeting is held as a meeting of the National Committee for the Prevention of Blindness in conjunction with the Standing Committee on Conservation of Vision of the Conference of State and Provincial Health Authorities of North America and our first paper is the "Prevalence of Trachoma Among Appalachian Mountaineers and the Co-operation Plan of Relief Between United States Public Health Service and State Health Departments." This paper is to be presented to us by a man who has devoted a great deal of thorough and painstaking effort to the study of the prevalence of the disease and its eradication, Major Paul D. Mossman, Surgeon, United States Public Health Service, Rolla, Missouri.

Prevalence of Trachoma Among Appalachian Mountaineers and the Co-operation Plan of Relief Between United States Public Health Service and State Health Departments

PAUL D. MOSSMAN, M.D.
Surgeon, United States Public Health Service, Rolla, Missouri

I am going to take the liberty of considering the prevalence of trachoma, not merely in the southern Appalachians, but as it is represented generally among the white population of this country in the southern mountains. We have other mountains than the Appalachians, though none more beautiful.

We have a population in the southern Appalachians which is one of the unique groups of people in the United States. It is unique because it is almost entirely homogeneous. There are whole counties in this area in which no person of foreign birth exists or in which no negro lives, even today. The inhabitants are white Anglo-Saxon natives whose ancestors settled in through the mountain regions just before and just after the Revolutionary War and their descendants are still resident in that area. That includes West Virginia, eastern Kentucky, western Virginia, eastern Tennessee and over into North Carolina. When these folks settled there in the beautiful valleys of the Appalachians, their land was as good as anybody's. There was enough for everybody. As population increased and competition grew harder, the adventurous sons of these people started west, following the Ohio toward the west.

They found the Blue Grass Lands already taken up so they went farther westward and found in the Ozark region of Missouri and northern Arkansas a type of country to which they were accustomed, namely, a hilly country, similar in many respects to the country in the Cumberlands, and the hills of Scotland from which many of their ancestors had come.

So we have in southern Missouri and southern Arkansas a population very similar in character and, in fact, we find many of the family names in this territory that can be traced back to the families in Kentucky, Tennessee and Virginia.

Regarding prevalence—in a disease as chronic and as widely scattered as trachoma, it is practically impossible to give accurate figures as to exact prevalence. Many of these patients have never had a physician. The disease is not adequately reported in all states and for these and other obvious reasons it is impossible to give accurate statistics on prevalence. A remark that ex-Governor Hagerman, Commissioner to the Navajo, made in the Conference of the National Committee for the Prevention of Blindness last year, is significant. In speaking of prevalence among the Navajos, Mr. Hagerman enunciated an important epidemiological fact showing that although a layman, he is a very acute observer. He said some examiners have found 30 per cent of trachoma among these Indians, some say ten, some say five. Suffice it to say that there is a considerable number and that the disease is doing a great deal of damage to these people. It does not matter whether there are five per cent or fifty per cent; we have a problem and that is what we can say in regard to our white population where the disease is prevalent. We cannot say there is one-half of one per cent or five per cent. It is probably somewhere between there, but we know from the effects of the disease that we have enough to constitute a public health problem and for that reason the United States Public Health Service has interested itself in this disease.

The attention of the United States Public Health Service was directed toward this problem partly by a report of our friend, Dr. Stucky, of Lexington, calling attention to the prevalence of the disease as he had seen it in eastern Kentucky, and following that, and partly on account of it, perhaps, the United States Public Health Service was invited by the Kentucky State Health Department to make a survey, and in response to this request, Senior Surgeon John McMullen, then Surgeon of United States Public Health Service, was sent out to Kentucky. As the result of the surveys Dr. McMullen made, the plan which I shall presently tell you about was evolved.

Dr. McMullen examined some 18,000 people in eastern Kentucky and Dr. Taliaferro Clark of the Service examined perhaps an equal number over the line in West Virginia and Virginia. As a result of the survey of the amount of trachoma they found there, Dr. McMullen recommended to the Service that action be taken and he was then sent back to Kentucky in charge of the trachoma prevention work, which started from that point.

I want to pause, if I may, to pay tribute to the farsightedness and the intelligence and thoroughness of Dr. McMullen's plan which we

have followed ever since. It has been my privilege to work with Dr. McMullen and to succeed him in charge of this work, but I want to make it clearly known that credit for the evolution of the plan is due to Dr. McMullen.

The first hospital was located in eastern Kentucky at Hindman in September, 1913, and another hospital in Leslie County at Hyden in that same month. Then the next spring one was located up in eastern Kentucky at Jackson, Breathitt County. One of our best known hospitals is in Jackson, although we have had several others in the State of Kentucky. In the next year the work branched out from Kentucky over into Virginia. A hospital was located there and one in West Virginia, which is where I got my start in 1916 on trachoma work and then one was established in eastern Tennessee and has been continued in that State ever since, at different points.

It was the plan of Dr. McMullen to work in co-operation with state and local health authorities and this has been carried out ever since. The State of Kentucky in the beginning gave financial co-operation when it could, and when it could not, gave the heartiest kind of moral support to the movement and the hospital at Hindman was kept there for some four years and then moved to Pikeville over on the border. The hospital at Jackson was continued for about eight years and then moved to Arkansas. The one at Hyden was kept there for some years and moved down to London.

In operating these, what might be called field hospitals, we use large dwelling houses which are adapted as well as may be to our use as hospitals, accommodating from fifteen to thirty patients and utilized at the least possible expense. Nothing is elaborate in our hospitals, but we do try to have them clean and decent and to do work that would be acceptable anywhere.

We have, in addition to the hospitals, conducted field clinics in the region about the hospital, examining suspected cases of trachoma and giving advice applicable to the individual case, encouraging these people to come to the hospital, for this disease requires hospital treatment. The operation is of little avail unless adequate after-treatment can be given and thus we have gradually discontinued doing operative work at the clinics but are encouraging the people who need operations to come to the hospital. The virtues of the field clinic are in establishing diagnosis and determining in a rough degree prevalence of the disease in a particular community, in giving public health education to the people and in making a personal contact with them.

Many of these mountain folks have the idea that a Government representative is somebody who has come to do them harm. It is

part of our job to let them know that we are human beings who have their interest at heart and will do them no harm. This is a very important part of our field work. These people love their children the same as anybody else does, and it is quite difficult to convince people that they ought to send their children away from home. These folks are not much on going away from home and it is hard to convince them that they ought to send their children to the hospital, but when they see the doctor and nurse who meet them and look after them at the clinic are the same people who will take care of them at the hospital they lose some of their fear and distrust.

The present organization of the trachoma prevention work is administrated at my headquarters in Rolla, Missouri. We have headquarters there and one of our trachoma hospitals and our research laboratory, which is in charge of Dr. Bengston, who is one of the bacteriologists from the hygienic laboratory at Washington and who is devoting all of her time to research. We also have an epidemiologist, Dr. Rumreich, who is making an intensive field study of trachoma to determine what effect, if any, environmental factors have on the incidence and spread of the disease.

While we are on the subject of prevalence, I want to call attention to some figures that have been evolved in Missouri which give the most accurate account of the prevalence and results of trachoma anywhere in this country. The Missouri State Commission for the Blind, under the efficient secretaryship of Miss Audrey Hayden, has had charge of the Blind Pension Law Administration and Miss Hayden's figures, which are soon, I hope, to be published, give very enlightening data in regard to the prevalence of the disease in Missouri. Missouri's Blind Pension Law provides a pension of $300 a year to any person totally blind from any cause; that is, a person who has no other means of support. On account of the lack of funds to provide pensions for everybody who is industrially blind, the standards were strictly drawn so that any person who has more vision than mere light perception is ineligible for a pension. It is very easy to see that many people who are industrially and economically blind are ruled out of the benefits of this pension law in Missouri.

The latest figures issued give the total number of blind pensioners at 3,152, and of these pensioners, those in whom the cause of blindness is given as trachoma, is 637 or 20.2 per cent. It may be urged that these people incidentally had trachoma but the cause of blindness was some other disease. That might be a valid objection perhaps, but on that point I would like to say that these cases have all

been examined and re-examined by Dr. Meyer Wiener of St. Louis and Dr. Albert Lemoine of Kansas City, whose standing as ophthalmologists can hardly be questioned. So I think that the number of cases in which trachoma is given as the cause of blindness and in which blindness is actually due to some other condition is negligible. As to the economic effect of trachoma in this number, if it exists, is easily overbalanced by the number of industrially blind who are not included in this list. These 637 cases of total blindness due to trachoma are costing the State of Missouri $191,000 annually in pensions alone, to say nothing of the cost to the community of the loss of industrial efficiency of these people who, if they had their eyesight, would be earning a great deal more than this amount.

In extension of our work I have been anxious to find out just what the results of our hospital treatment are. Most of our patients when they are through with the hospital go anywhere from fifty to two hundred miles to their homes and those who are angry with us never come back and those who have been well treated never come back, even though perfectly relieved. Some of those who have received only partial benefit but still have kind feelings toward us come back for further treatment. That is often necessary. But I have always been anxious to know what became of the rest of them, whether they were so angry they would not come back or whether they were so well off they didn't need to come back.

So this summer I have put a well-trained public health nurse into a county in Missouri that is just south of the one in which Rolla is located—Texas County. Texas is the biggest county in Missouri. It is a rough, hilly county with no railroad through it. The railroad just touches the southwest corner—a truly rural section with no railroads nor coal mines. The principal industry outside of farming is some lumbering on the east side of the county and a factory that makes coffins in Houston. It will give you an idea of what the people there do.

I gave this nurse a list of the patients who had been treated in the hospital or in any of our field clinics. Her job was to look up these people in their homes and record data as to their present condition and what they had done since leaving the hospital. Old or new cases were so recorded. Incidentally, she found a great many new cases, in addition to about 75 old cases that she was instructed to look up. She found in the three months that she has been out, 254 new and old cases, and I have instructed her not to attempt to work fast. She sees an average of only three old cases a day. It takes some time to fill out the form and what we are after is accuracy

rather than numbers. But, as can be seen from that form, we get the history of the patient after he leaves the hospital, or, if it is a new case, a general history of his disease; what treatment he has had since leaving the hospital, if any; how much trachoma has interfered with his present occupation; what his present occupation is; and his regular trade; whether he has had to give up his skilled trade and do something else. Every Saturday we have had a clinic in Houston; the doctor in charge of the trachoma hospital, or I, sometimes both of us, conduct this clinic. It is in the nature of a round-up. The nurse sends in or brings in all the people that she has seen during the week, both positive trachoma and suspects. We weed them out and help her to fill out the data. All of these data in regard to the diagnosis and pathologic conditions are made by the doctor. The nurse does not make a diagnosis although the nurse that we have in the field is pretty good at it. The doctor confirms these or denies them on Saturday and we have had, on an average, since the middle of July, every Saturday an attendance of over one hundred people, over two-thirds of them, as a rule, being trachoma cases who come in for diagnosis and advice. The demand grew so insistent that we have done some treatment.

Our hospital is full to overflowing and we have not been able to take them into the hospital, so we do what palliative medical treatment we can there, and keep them under drops at home and use applications to the lids which will keep them from getting worse. While we do not assure them of anything like a cure, it will carry them along, keep them from getting worse until we can take them into the hospital for intensive treatment.

I am not ready to report completely on the work of this field nurse because it is not yet completed. She is going to be in the field for several weeks longer. She is recording environment, the type of dwelling and the number of rooms, the number of families and the light and ventilation, facilities for washing and for bathing. Some of you people may not realize that these folks have to go anywhere from a hundred yards to a half mile to get their drinking water or their washing water, and it goes without saying what with water coming as hard as that, the people are careful with it and they do not lavish it. It is only natural to do as they do, put off washing until it is absolutely necessary.

We are endeavoring to do something in the way of getting data on the diet of these people. That is a long, hard job and takes a great deal of time and I am not sure that we are going to be able to continue that in connection with the work of the field nurse. The other features are so insistent that I wonder whether the dietary

data she gets is of sufficient value to compensate for the time that she has to give to it. I think it is worth while to do this work but I think that perhaps we had better do it under the direction of our epidemiologists and persons who are especially trained in doing that work or in collecting that sort of data.

I want to say in connection with the work of our hospitals and clinics, it is three-fold: First, the treatment of the disease with a view to relieving that particular person and removing him as a focus of infection; second, the study of the disease from the bacteriological and clinical standpoints; on the one hand to discover, if possible, the bacterial cause of the disease and on the other side to evolve better methods of treatment; and last, but not least, the public health education of our patients. We believe that we have done something very worth while along this line. The patients who go back to their homes—and our field workers see them in their homes—live a more sanitary, more hygienic mode of life and we believe that this part of our work has been tremendously effective.

Texas County has never had anything like a full-time health organization. They have a part-time health officer who is a practising physician and whose work as health officer is merely incidental. Largely as the result of our work in Texas County this fall, they are going to put on a full-time public health nurse right away in the hope of getting a full-time heath organization later. We must await results.

CHAIRMAN WILDER: I shall change the order of the program somewhat by asking for the fourth paper next, that by Dr. Wilinsky, who is to read us a paper on the subject of, "Trachoma in Palestine." Dr. Wilinsky, who is a Deputy Commissioner of Health of Boston, Massachusetts, has had a very interesting trip in the Orient and I am sure we will all be pleased to hear of the condition there in regard to the subject of trachoma. As I mentioned to you in my opening remarks, it is in those eastern countries where we see this disease most widespread, particularly in Egypt and in Palestine. Whether this is due to the peculiar condition of the soil, or whether it is due to the atmosphere and the climate, or whether it is due to the marked prevalence of unhygienic conditions which must, of course, influence it greatly, is of course of great concern to everyone engaged in the study of it. The disease is oftentimes seen in those eastern countries in a masked form and sometimes it is seen as a complex disease, so that different workers in the field of trachoma in the East have been at some loss at times to differentiate the different ocular maladies observed there. I am sure we shall all be pleased to hear Dr. Charles Wilinsky.

Trachoma In Palestine

C. F. Wilinsky, M.D.
Deputy Commissioner of Health, Boston, Massachusetts

Palestine is relatively in the same position in regard to trachoma as other Eastern countries, with the disease highly prevalent among the Arab and Jewish population. A government report of five years ago stated: "Trachoma was regarded as the most important disease among school children." At that time 97 per cent of the children in some schools were infected with trachoma and over 15 per cent of all the children suffered from markedly defective vision.

Before 1914 the disease was equally prevalent among Arab and Jewish children, a situation which was aggravated considerably by poor sanitary conditions during the war.

Statistical Facts and Figures.—We are informed in the literature on trachoma in Palestine, that in 1896 Dr. German conducted an examination of approximately 1,100 children, finding 38 per cent of those in the town schools and 64 per cent of children in the village schools infected with trachoma.

In 1913–1914 a group of 9,329 children were examined in the Hebrew schools of Palestine, among whom were found 2,423 cases of active trachoma, this constituting about 26 per cent of the school population.

In a series of 1,500 examinations of children and adults, conducted by Dr. Feigenbaum, approximately 27 per cent of trachoma was found in youngsters under three, and about 28 per cent between the ages of eight and fourteen, and 33.9 per cent between the ages of 15 and 20.

Dr. Ticho, in 1914, in a series of 4,314 children examined in the schools of Jerusalem, found 1,206 infected with trachoma, the rate varying in different schools from 15.5 per cent to 81.6 per cent.

Dr. Friedenwald reported on a series of 2,000 cases—half of them children. He found 54 per cent of the above group suffering from trachoma, percentage varying from 8 per cent to 85 per cent. The general belief is that the incidence of trachoma in the adult population is about equal to that found among children.

Epidemiology.—There appears to be more trachoma in southern than in northern Palestine. An important factor appears to be the

conditions under which the people live. The Arabians usually are found living in huts of mud, with very poor light and ventilation, and living under very crowded conditions. The spread of the disease under such conditions appears to be caused by direct contact with flies, which is said to be influential in the spread of trachoma.

The extremely hot sun, the hot temperature, scanty water supply—all appear to be important factors in diseases of the conjunctiva. Conjunctivitis is highly prevalent in the summer time, with the Bacillus Koch-Weeks as the chief cause. These conjunctival irritations, accompanied by an infection of trachoma, tend to do a great deal of damage to the eye. A scant water supply is regarded as an important factor in the spread of trachoma. The lesser prevalence of trachoma in the North is explained by the greater rainfall and a smaller degree of overcrowding by the population. Dust and sand, blown by the winds from the deserts, are more prevalent in the South.

Anti-Trachoma Program.—An extensive anti-trachoma campaign for the reduction of trachoma is being carried on both by the Government Department of Health and the Hadassah Medical Organization for the school children of Palestine. Over 20,000 children attend the Government schools, and about 23,000, the Hebrew schools, which receive their medical service from the Hadassah.

Program by Government in Schools, Eye Clinics, Dispensaries, etc.—The Government maintains systematic anti-trachoma treatment in the Government schools. Children are examined by an ophthalmologist and those suffering from diseases of the eye are placed under special care, being sent to clinics for treatment. All other children are given prophylactic treatment daily by school nurses under the direction of a physician.

A number of clinics are maintained by the Government in the districts of Gaza, Hamlah, Nablus, Tailkran and Beershaba—all Arab colonies—where the disease is highly prevalent. Government health officers and nurses are being trained in the essentials of ophthalmology at the British Ophthalmic Hospital in Jerusalem. In 1925, 10,000 cases were treated in the Government schools and about 70,000 consulting visits were made; 2,000 ophthalmia operations were performed. There has been a material reduction of trachoma among Arab school children.

Anti-Trachoma Treatment for the Jewish Population.—Since 1918 active anti-trachoma work has been carried on among the Jewish children in the Hebrew schools by the Hadassah medical organization. When the latter organization, then known as the

American Medical Unit, arrived in Palestine in 1918, a study was made by its ophthalmologist, Dr. Krimsky, who, on examination of 8,506 children, found 40.7 per cent suffered from active trachoma. There was practically no difference in the ratio of infected children between the Hebrew and Arab schools at that time, 46.3 per cent being found infected in the Arab schools.

Systematic anti-trachoma treatment is carried on in the Hebrew schools as well as in the clinics, both city and rural. In the cities, the ophthalmologist in charge examines all the school children at the beginning of the school year, and then at the beginning of each semester. Children suffering from diseases of the eye are examined every month. Each child has its eye chart, whereon the date of examination, diagnosis, and method of treatment are noted. Children affected with acute conjunctivitis, follicular trachoma, and all cases where there is a secretion are kept out of school, and sent to the Hadassah medical organization clinic for treatment.

Experience has shown that the most important feature of the anti-trachoma work is daily treatment. The treatment is administered by specially trained nurses in rooms in the schools set apart for the purpose. The nurses submit detailed reports of their work. All statistical material, such as reports of ophthalmologist on his examinations, monthly reports on number of treatments given, etc., are sent to the Hadassah medical organization headquarters for the attention of the Department of School Hygiene. Methods of treatment are both medical and surgical. Cases of follicular trachoma are treated in the clinics. In the rare cases where there are complications, operations are performed.

In the colonies, the anti-trachoma work was begun only in 1924. The ratio of infection was greater there than in the towns. There are many reasons for this condition, the chief of which are: (1) The Arab workers, most of whom are affected with trachoma, live in the colonies; (2) bad sanitary conditions abound in most of the old colonies; (3) water supply is insufficient; (4) the population is of a low cultural level.

Most of the colonies had no resident physicians before the war. But after the war, through the efforts of the Hadassah medical organization and the Zionist executive, organized medical service was provided for nearly all the colonies. It then became possible to introduce systematic anti-trachoma activity in the rural settlements.

The circuit ophthalmologist has to make systematic rounds of all the rural settlements in the country. The system of daily treat-

ments is the same as that in the city schools, with the difference that in most of the colonies the adult population is treated as well. The ophthalmologist examines children and adults, records his diagnoses on special charts, and outlines the method of treatment. He performs the necessary operations, and gives instructions to the local physician for treatment of eye cases. The children in the colony schools are subject to the same rules as those in the city schools. The periodic visits of the ophthalmologist are very important. The village medical staff is composed of the general practitioners and the nurses, who were afraid to assume the responsibility of the anti-trachoma work. When the specialist began to make frequent visits, however, they willingly consented to administer the daily treatments. This is a very monotonous work, and the visits of the ophthalmologist stimulate the interest of the medical staff. Attention is also given to preventive measures. The visiting ophthalmologist arranges lectures, and has discussions with children, parents, and teachers.

The comprehensive and persistent work in town and country has shown good results. In all the Hebrew schools of Palestine there were, in 1918, among 8,395 children, 3,420 cases, or 40.7 per cent, of active trachoma. The following table denotes progress made in the Hebrew schools:

In 1923 among 13,375 children, 2,104 cases, or 15.73 per cent, of active trachoma
In 1925 among 16,053 children, 1,933 cases, or 11.7 per cent, of active trachoma
In 1926 among 18,491 children, 1,927 cases, or 10.4 per cent, of active trachoma

Conclusions.—Those who define trachoma as a deficiency disease find as much basis for their argument in Palestine as in any other section where trachoma is prevalent. Able ophthalmologists in Palestine stress the fact that infection is influenced by lack of water, poor general sanitation, over-crowding as well as low economic status, which usually accompanies the above cycle.

The disease is usually contracted during the pre-school age, the mother being a source of frequent infection.

It is found that conjunctivitis and other complicating eye infections, when accompanying trachoma, cause serious results.

There is an urgent need of increasing town and rural eye clinics, making it easier for people to receive treatment. Increased hospital facilities for eye operations are necessary.

While excellent eye treatment in the schools is a valuable aid in checking further damage as well as in cleaning out of a source of infection to others, it is not a real factor in the prevention of disease, as the child has contracted it before it comes to school.

Its high prevalence among families in some districts may be noted from the fact that in Sidjera 50 per cent of all families were infected with trachoma.

The opinion of the leading ophthalmologists in Palestine is that trachoma is a preventable disease, its control being influenced by prophylactic treatments and education. Crowded clinics are not very conducive to the marked reduction of the disease. Education and prophylaxis must become sheet anchors.

The important problem appears to be the solution of the conditions prevailing in the homes of the families, examination, if possible, of the family unit, particularly in the poor and congested quarters, the setting-up of local anti-trachoma clinics, and the employment, if possible, of nurses for home treatment and as educators.

One of the most important factors lies in the improvement of general sanitary conditions, particularly the need of a good water supply for the community.

I visited a number of the Government and Hebrew schools and saw a systematic anti-trachoma work being carried on. I also saw prophylactic treatments given in many of the schools. There is no question in my mind that continuance of this work is going to play an important part in the reduction of trachoma. We cannot lose sight of the importance of general sanitary conditions which are usually coupled with the economic status of most of the population.

There is noted an increasing interest in prophylactic treatment and in attendance at eye clinics. This is a happy change, which ought to help a great deal in the fight against trachoma.

Discussion

CHAIRMAN WILDER: Are there any questions you wish to ask Dr. Wilinsky in regard to his paper because he wishes to be excused from the meeting.

QUESTION: Is the operative treatment carried on over there to a great extent?

DR. WILINSKY: Yes, the operative treatment is carried on, as a rule, in the hospital and in some of the other Government hospitals.

DR. ROYER: We want to thank Dr. Wilinsky for having come and given us this picture as he is suffering from a severely sprained ankle.

I am very much impressed with some correspondence from one of the gentlemen, Dr. Freidenbaum of the Odessa organization and with one particularly significant remark in one of his letters to me in which he said, "Trachoma seems to occur only in families who stand below the level of civilization."

CHAIRMAN WILDER: The next number on the program will be the "Minnesota Plan of Using Indian Nurses." I might say as an introduction to this subject that we have in this country among that class of people who pride themselves on being really one hundred per cent Americans, the Indians, a great deal of this scourge. Strangely enough, we have among certain of the Indian tribes, I won't say among them all, a peculiar prevalence of trachoma. The contagious feature seems to be demonstrable here as it seems to be in other countries like those we have heard described. Contrast with this the Ethiopian race in this country in which practically no trachoma is found. Indeed, some ophthalmologists of repute and great experience among the negroes have pronounced that they never find a case of trachoma among the negroes, although this has been disputed by some other observers who have found, now and then, a rare case. Suffice it to say, it certainly does not affect the negro race as it does the American Indian race, and we have in our country now, as wards of the nation, these people, many of whom are afflicted and who come under the Public Health Service. There is a very serious and earnest attempt being made by the United States Government to stamp out this scourge among its wards and under the advice of different persons who have been consulted, it has been suggested that they carry on a campaign of education among the Indians and particularly a campaign of nursing among them so as to spread the intelligence as to how the disease is conveyed and the means of its prevention and treatment. The nurse who is employed among these people for this purpose is a very important factor in the control of the disease. It has been found that some of their own people can be trained to serve as nurses, and Dr. Chesley will enlighten us on this subject, which is an interesting part of the combat against this disease among the American Indians.

Minnesota's Plan for Using Indian Nurses

A. J. Chesley, M.D.
Executive Officer, State Department of Health, St. Paul, Minnesota

In the special reprints of the National Committee for the Prevention of Blindness entitled, "The Public Health Aspects of Trachoma," and, "Trachoma: Report by the Standing Committee on the Conservation of Vision of the State and Provincial Health Authorities of North America," an account of the prevalence of trachoma particularly among the Indians and of the measures used against trachoma will be found. In one of these reprints reference is made to the Chippewa nurses in Minnesota. Their work relates to the prevention of blindness.

Dr. S. J. Crumbine of the American Child Health Association deserves the credit for the establishment of the Chippewa Nursing Service. After spending several days among the Indians he secured a subsidy of $3,800 from the American Child Health Association, for Minnesota. This gift was matched by the Children's Bureau with Sheppard-Towner funds and the whole amount was used to start two Chippewa nurses in public health work under the Division of Child Hygiene in October, 1923.

Being familiar with the Indians' sincere interest in the welfare of their children we planned to do something for the babies and mothers as an entering wedge for a general public health program.

The Indian Bureau rates the intelligence of the Chippewas very high. Our Indian nurses are graduates of high schools or colleges and after completing the regular course for nurses in an accredited hospital, such as Ancker Hospital, St. Paul, they take the course in public health nursing at the State University and spend from one to three months in field work before entering our service. They speak Chippewa, know the tribal customs and have the essential qualifications of fine personality and common sense. They have many opportunities to make observations about eye diseases.

When the United States Public Health Service studied infectious diseases among the Indians throughout the United States in 1913, the doctors remarked that only very few Indians showed the late effects of syphilis on the nervous system. Venereal diseases were supposed to be very prevalent among the Indians and they were

unable to account for this situation. Although the proportion of the total Indian population they examined was relatively small because many Indians were away from home, fishing, hunting, etc., they expected to find all paralyzed or partially paralyzed Indians as they would be the only ones not able to travel.

Through active co-operation of the Indian Bureau officials in Minnesota our Chippewa nurses are trying to get more information on the prevalence of syphilis. They collect specimens for Wassermann tests whenever possible without regard to the previous history of the individual. Recently one nurse sent blood from 192 Indians, all sixteen years of age or older. Twenty-six per cent showed positive Wassermann reactions. As information accumulates on this subject its relation to eye diseases will be determined.

Dr. Taliaferro Clark of the U. S. Public Health Service investigated trachoma in Minnesota in 1911–1912, both among whites and Indians. Its prevalence among Indians was studied further in the survey of 1913, and since then several studies have been made and trachoma prevalence is quite well known. In 1924 and 1925, Dr. Paul D. Mossman, of the U. S. Public Health Service, co-operating with the St. Louis County Board of Health, conducted a trachoma hospital at Eveleth and many cases were cured.

The Indian Medical Service, now under Dr. M. C. Guthrie, gives splendid co-operation. Minnesota is in the district assigned to Dr. Emil Krulish, of the U. S. Public Health Service, who has headquarters in Minneapolis. Dr. Krulish and Dr. L. L. Culp, Eye Specialist of the Indian Bureau, work with our Chippewa nurses.

The diet of the Indian generally is a poor one. Vegetables are not used much. The Indian does not raise vegetables to any extent but buys canned tomatoes and fruits when he has money. Few cows are kept because one must stay at home to take care of a cow. In carrying on the anti-trachoma campaign, our Chippewa nurses will use Dr. Mossman's form to collect epidemiological information on diet, etc., as a possible factor in causation of trachoma. The instruction about diet for the children given by the Chippewa nurses to the Indian girls and mothers has had good effect on the diet of the whole family. Living conditions among the Indians will improve as the tourist traffic increases since the tourist is the largest contributor to the income of these people.

No doubt many Indian babies have become blind through lack of care. To what extent ophthalmia neonatorum has affected Indian babies in the past we can only surmise, for blind or nearly blind Indian children have rather a poor chance of survival. Our Chip-

pewa nurses assure me that the Indian women always call the nurse or doctor now if a baby has sore eyes after birth. Our nurses know of only one child a year and a half old who is blind in both eyes from ophthalmia neonatorum in an Indian population exceeding 10,000, and they have found only ten cases, all of which were treated and saved from blindness. These ten cases were probably of gonorrheal type but no laboratory examination was made.

Secretary Work favors employing Indian nurses for field work. While we have but three nurses for 14,300 Indians scattered over a large territory, the nursing work shows results already and it should be an important factor in the prevention of blindness and the conservation of vision. Their work has been made possible through the subsidy, supplemented by $900 from the Federation of Women's Clubs in Minnesota, to carry it on until the Legislature met. It will indeed be a calamity for the Indians when the federal aid now received under the Sheppard-Towner act is discontinued unless the state appropriates funds for the Chippewa Nursing Service.

The health officers of states with Indian problems are very grateful to the National Committee for the Prevention of Blindness for the services of its staff, especially Mr. Carris and Dr. Royer, who have aroused interest in the menace of trachoma and other diseases which cause blindness among Indians.

Trachoma as a Public Health Problem: Wisconsin's Plan of Supplying Public Health Nurses

C. A. Harper, M.D.
State Health Officer, Madison, Wisconsin

Wisconsin has some 10,500 Indians. Of these 8,003 are wards of the Federal Government. About 2,500 are independent citizens of the state. For many years the health and social condition of the Indians have been a matter of general discussion; also, it has been a matter of concern that the white population bordering on Indian settlements might be especially endangered as a result of the prevalence of certain types of diseases and especially trachoma in the Indian population.

Before 1925, the Indian citizens of the state, off the Reservations, received practically the same attention from state and local health officials and public health nurses as the white population. The Indians on the Reservation were under the jurisdiction of the Federal Government in the matter of health as well as regulatory problems, and therefore the state took but little part in the health regulations of such Indians.

The presence of trachoma with the Indians, its seriousness, and apparent high contagiousness tended to create a state problem as well as a Federal problem, because there was constant intermingling of the Indians with the white population of the state. A number of the Indian children were attending the public schools, and it was feared that trachoma especially would become an active public health problem with the white citizens of the state.

Not until 1924, however, was a definite plan formulated for closer co-operation between the Federal and state authorities for determining the health conditions of the Indians, especially those on government reservations, and the effect such health conditions might have upon the citizenship as a whole. At this time a survey was made by a Federal physician, a Federal public health nurse, a state physician, and a social worker. Practically all the Indian colonies and reservations as well as many Indian homes were visited and a careful study made as to housing and social conditions, with special reference to

the prevalence of trachoma and the possibility of excessive tuberculosis, and general consideration given to the venereal disease problem.

During this survey there were 4,215 Indians examined, from eight different tribes, equalling more than half of the Indian population who were wards of the Federal Government. Seventy-nine cases of active trachoma were diagnosed in this survey. A great many serious cases of tuberculosis were discovered. Tuberculosis prevalence with the Indians as compared with the whites could not be definitely determined as a result of this one survey. On account of the reticence of the Indians it was difficult to form a reliable statement concerning venereal disease.

It was determined, however, that the habits and customs of the Indians presented a large social problem. The Legislature of 1925, therefore, gave special consideration to the health problems of the Indians and appropriated annually not to exceed $8,000, "for public health work and the investigation and prevention of disease with special reference to the Indian population of this state." The first money was available July 1, 1925.

The State Board of Health in conjunction with a special Federal physician and nurse worked out a tentative program for detailed public health work with the Indians. In order, however, to obtain a better understanding as to the wisest policy to pursue, a conference was held at Wisconsin Rapids, a city in the central part of the state, for a general discussion of the proposed program. There were present at this conference about 30 Indians, a special physician from the Indian Bureau, a nurse in the government service, two physicians from the local Indian agencies, superintendents from all the Indian agencies in Wisconsin, the president of the Wisconsin Conference of the Catholic women's organization, the president of the State League of Women Voters, the superintendents of the various Indian schools, the federal supervisoress of Indian and Field matrons, in conjunction with the director of the Bureau of Communicable Diseases, deputies, social workers, of the State Board of Health and the State Health Officer.

At this conference all the white people present took part in the discussion and nine of the thirty Indians stated what they believed was the best policy to pursue. The unanimous conclusion reached was that public health nurses would probably get closer to the Indians and do more efficient work than any other type of public health worker that could be employed under the moneys appropriated. The conference was in accord, therefore, with the selection

of two full-time public health nurses to be equipped with Ford coupés and other necessaries, one to be assigned to the jurisdiction of the Winnebago Indians, Wisconsin Rapids Agency, which had no health worker, and the other nurse to be assigned to the Chippewas at Reserve Agency, near Hayward, which also was without a public health worker. These two tribes were not only without health workers of any type but from a financial standpoint had much less of the worldly goods coming to them than most of the other tribes.

The plan laid down as a result of this conference was practically as follows: The nurses were to make home visits, give instruction in homes as to simple problems of illness, diet, home nursing; make investigation of health problems and individual illnesses; give limited bed-side nursing; get in touch with tuberculosis suspects and other cases needing institutional care, getting them placed in institutions; give instructions to mothers on pre-natal and natal care, and instruction to girls' classes in mothercraft; give instruction to mothers and girls as to preparation and selection of food for the sick; and make examinations of children in all schools, etc., the last to include the seeking of medical and surgical care whenever indicated. It was further agreed that the federal physician and his nurse should continue their regular work in the state as had been done for some twenty years, and that this physician and nurse should spend about a week every six weeks with each nurse for the purpose of diagnosis and administering such treatment as might be given at such times.

The policy laid down at the beginning of the public health program is in the main the policy that has been followed for the past two years. The Indian public health nurses, therefore, not only plan to follow the schedule, generally speaking, of public health nurses as a whole, but from time to time devote their energies to limited bed-side nursing, administering first aid, and follow up cases of actual illnesses. They do not practice medicine but they are fully supplied with the usual household remedies to meet many simple conditions that may be found.

This conference also demonstrated the fact that there is a considerable bond of sympathy between the various Indian tribes as a result of the unanimous agreement of representatives from the various tribes that the tribes most needing health workers should be the ones to receive such assistance.

Regarding trachoma among the Wisconsin Indians, in 1912 a representative from the United States Public Health Service made a survey with special reference to the prevalence. Unfortunately this report, as far as I am able to learn, was never published.

Apparently, however, trachoma was quite prevalent at that time. The special federal physician, however, in 1917 and 1918, made 2,482 examinations with a record of 315 cases of trachoma. By comparing this with the 4,215 Indians examined from eight different tribes in 1924, where only 79 active cases of trachoma were diagnosed, it can be safely assumed that trachoma in the Wisconsin Indian is more or less rapidly on the decline. Each of the last two surveys were made by the same person, which would obviate any difference of opinion of diagnosis. It also is found that in each survey after the first, where the facts are recorded, a special effort was made to look up former cases and their contacts. Particular effort has always been made to encourage the enrollment of patients of school age in some school where regular treatment could be carried out, the trachoma cases being segregated for the protection of the general school population. The entire personnel of the student body in any boarding school averages a complete change every three or four years. The examining physician further stated that the 1917 and 1918 cases of trachoma, of which there were 315, were not all acute cases.

Our early fears concerning the invasion of trachoma into the white population were apparently not well founded. Special effort has been made to get in touch with the medical profession of the state in territories more or less adjacent to the Indian colonies for the purpose of having them direct special efforts to various types of eye trouble coming to them for treatment for the purpose of determining whether such eye afflictions might be due to trachoma. During the last three and one-half years 45 cases of trachoma have been reported to the State Board of Health, since under the law trachoma is a reportable disease. This includes the findings of that portion of the Indians coming in contact with local physicians as well as the white population. The trend of trachoma, while a factor to be reckoned with at all times, is toward a marked reduction in its prevalence. All trachoma cases found with the Indian population are surgically treated by the special physician of the Indian Bureau, and the follow-up treatment is taken care of by the public health nurses where they are available.

We have been fortunate in that the Indian Bureau has had detailed a fine type of man as specialist on the subject of trachoma, who has been handling the trachoma problem with the Indians of this state for the last twenty years and, as far as we are able to determine, with most satisfactory results, as the decline in the prevalence of this disease would indicate. Just how much better housing condi-

tions and better food conditions have been a factor in building up the resistance against trachoma cannot be measured. Generally speaking, however, it is possible to build a certain resistance to this type of infection as well as to other forms or types of infection.

You will note that since the special appropriation was made in 1925, two nurses have been actively at work. One, as before stated, with the Chippewa Indians, population 1,280, and the other nurse with the Winnebago tribe, population 1,283. The Chippewas at Reserve are more or less readily accessible, being distributed in the main in about four townships; while on the other hand the Winnebago tribe, without any reservation whatever, is distributed in some nine counties, which makes it a much more difficult problem for the nurse to handle. The Winnebago tribe also is considered a wandering tribe and many members are not always easily located.

The work of the two public health nurses has proven most efficient. I believe it is no longer an experiment. These nurses are able to obtain the co-operation of the red man to a very marked degree and in visiting the Indians there is always a plea to have the nurses retained. The results have been such that we believe it is a wise policy to pursue, so much so that in April of this year a third nurse was added to the personnel for public health work with the Indians. The third nurse is an Oneida Indian, well educated and properly trained as a nurse. She has been assigned to the Indians mainly on reservations where no public health nurse is employed, to work two or three months at a time along educational lines with the various tribes. The comparative merits of Indian nurses for this work and white nurses working with the Indians, I cannot state. It can be safely said, however, that the white nurses have proven most efficient. We were extremely fortunate in obtaining two such capable public health nurses, thoroughly interested in this type of work.

It might be of interest to summarize briefly the work of the two nurses for the year 1926. We find that the number of schools visited was 9; a total of 68 school visits; the number of pupils enrolled, 586; number given complete inspection, 307; partial inspection (various times) 446; individual conferences, 253; examined by physicians, 180; by dentists, 155; classroom discussions, 34; first aid in schools, 34; number below normal grade, 275; number weighed and measured, 306, of whom 28 were under-weight, 3 overweight; defective teeth, 130, tonsils, 66; nasal breathing, 21; ears discharging, 4; hearing impaired, 14; eyes, 59; vision, 44; speech, 3; thyroid enlargement, 151; number of home visits, 915; number

of patients visited, 1,427; number of patients not at home at Reserve (the Chippewas), 6; number of patients not at home at Wisconsin Rapids (the Winnebagos), 92.

It is to be understood that within the jurisdiction of these two public health nurses there are a number of government schools. The total enrollment in these schools includes children of different tribes coming under the supervision of these two public health nurses.

The percentage of under-weight and over-weight is very little higher than that reported by the public health nurses for the school children of the state where public health nursing service prevails. There is, however, not sufficient data as yet for estimating the type and character of nutrition of Indian children examined in the schools. While the element of weight is a most important factor as compared to height, it does not, however, present a true picture concerning the resistance created, depending upon the quality of nutrition.

Of the 1,283 Winnebago Indians, 42 were placed in hospitals in the year 1926. Fourteen were medical, 18 surgical, and 10 for tuberculosis. Sixteen of these were accompanied to hospitals by the state nurse, 5 by county nurses, 13 by Indian relatives, and 8 by other individuals. The Wisconsin General Hospital or local hospitals were used for the medical and surgical cases; and the government Tuberculosis Hospitals for the Indians, none of which are located in Wisconsin, as well as the State Tuberculosis Sanatoria were used for caring for tuberculosis cases.

During the summer of 1926, the government school at Tomah was turned into a hospital for a period of six weeks, in charge of the special federal physician and a federal nurse. During this period of time all cases of trachoma or suspected trachoma were brought into this hospital for treatment, as well as many other types of cases, especially where tonsils and adenoids were a factor. The government took care of all the expense in this temporary hospital and of the transportation of most of the Indians, the state meeting the transportation costs of some. The various counties of the state have been giving the same attention to the Indian indigents as they have to the white indigents, for Indians off the reservations.

This, in brief, might be stated as the Wisconsin plan of carrying on public health work with the Indian population. Two chest clinics have been held under the direction of the Wisconsin Anti-Tuberculosis Association to determine the incidence of tuberculosis among the Indians. The conclusions reached by the examiners were that tuberculosis is only slightly more prevalent in the Indian

population than it is found in certain types of the white people. The report of the last examination in part stated as follows:

"Again we found but little tuberculosis though we had quite a number of contact cases, and we have come to the conclusion that the younger generation of Indians are building up immunity which they did not have before; and though there may be many deaths of older people, the younger ones, who live, will manage not to die of tuberculosis."

The co-operation of the Indians, the Indian Bureau, and local Indian agencies in working out the public health nurse program for a better health condition of the Indians, has been a material factor in impressing the State Board of Health with the merits of the policy it is pursuing. Since the public health nurse idea has been sold to the Indian, naturally it has been sold in Wisconsin to the public health officials and is an initial step, at least, towards better health conditions with the red man in our state. We shall endeavor to continue such a program as one of our policies.

The Indians show much interest in their children, and probably through the younger elements of the Indian population the educational work along the lines of public health will eventually build up better sanitation and health conditions as a whole. We are not endeavoring to get the Indians to assume the ways of the whites immediately, especially of the whites of the Great White Ways. The Indian's wants are small and his life is simple, and while there is much to criticize there is much to commend. His habits are those implanted by many generations. His habits and customs must naturally change as the environment in which he is obliged to live changes. He may be wiser than we think in endeavoring to cling to old customs, especially if contentment and happiness form the important goals of life. That he seeks better health conditions and better educational facilities for his offspring cannot be denied.

The possibility of greater success in this work is further verified because of the interest and enthusiasm that our public health nurses working with the Indian always manifest. The Indians have never had public health nurses of their own, therefore there is no tradition to break down, while the Indian medicine man has always been a prominent part of the Indian life. This tradition has been so well established for generations that we could not well substitute white medical men alone to gain the confidence of the red man as the public health nurse has gained his confidence.

It has been stated that the Indian is rather an uncertain quantity. The mothers, however, are very much interested and the children

are taking to the health and hygienic procedures in many of these tribes very satisfactorily and the Indian buck is cut off from his usual customs a good deal as a result of the closing in and changing of his environment and he probably, in a few centuries, will take up work. He does not like it though.

I have been with the Indians here recently more than I ever have been in the twenty or twenty-five years previously and while there is much to criticize, there are things to commend even with the Indian. He is contented and happy and he has this feeling also that every time he deals with a white man he gets the worst of it and I think he is 100 per cent correct.

Within ten days, here's an Indian who had a letter from a great big power company and a powerful company, saying that they would give the Indians in this community $5,000 to repair a road and build a bridge and the township would exonerate them from any responsibility or liability in all times to come. I asked him if they were going to build the bridge and he said, "We're afraid that we will build the road and build the bridge and then we won't get this money." There it is. You can't blame the Indian for much that has happened to him or his attitude at the present time.

Of course, we think that he ought to, with the environment that is around him, take up our ways, but somehow our ways may not be the best after all. The Indian is suspicious and it is going to take a long time for him to feel that the white public health physicians are really thoroughly interested in his best welfare in the long run. If you can convince him of that he will follow, for a time at least, instructions and the little folks will follow the instructions pretty generally and their homes do improve. They look dirty. The Indian appears to be more or less dirty and yet I want to say this for the Indian: Meeting him on the highway or seeing him in a little village does not give you the picture of a certain degree of cleanliness that may obtain in his home. His home is extremely simple—some of these Winnebagos can pack all their household effects, I think, on the running board of a Ford car and they often do and they just go from place to place. But they are pretty well nourished and they are reasonably happy, and we are working with the mother and the Indian child.

The Indian child in the school, while backward, is becoming more or less modernized and yet it is difficult to keep him from reverting back to very easy conditions after he has put in two or three years in very fine surroundings.

There is one thing that will have to be done with the Indian and that is to get him to build his home a little more in accord with

civilization, so to speak, and be a better provider. The moral condition of the Indian is bad, very bad. There is now law affecting the Indian. The Federal Government pays no attention, neither does the State pay any attention to the violation of the law for the Indian, nor for the usual code on the part of the Indians. What can you expect him to be at the present time? He has been a free lance and it is going to take time and a lot of labor in order to get him back in a field of progress.

CHAIRMAN WILDER: May I request Dr. Chesley to be good enough to read a paper prepared for this meeting by two health officials from California who could not attend? "A Trachoma Survey," prepared by Dr. Charles H. Halliday and Dr. C. S. Brooks.

A Trachoma Survey*

CHARLES H. HALLIDAY, M.D.
Epidemiologist, California State Department of Public Health
and
C. S. BROOKS, M.D.
County Health Officer, Imperial County, California

Introduction.—From 1920 through August, 1927, inclusive, there have been reported to the California Department of Public Health 2,899 cases of trachoma. The southern counties, Los Angeles, San Diego, and Imperial have reported the largest number of cases with the exception of the year 1921, when Modoc County reported 105 cases. The cases reported from Modoc County were the result of a survey of Indians in that part of the State.

In December, 1923, advice was received from the superintendent of city schools at El Centro, Imperial County, that there were being reported to him many cases of chronic eye infection that appeared to be trachoma. In January, 1924, the county health officer, also reported that a large number of pupils in the county schools had trachoma and requested assistance from the State.

After an examination of pupils in six schools throughout the County, it was estimated that 30 per cent of the children of the entire County had trachoma. As a result of this investigation a definite program was worked out and a competent ophthalmologist employed by the County to establish and conduct clinics, and to operate on those cases requiring operative procedure. An unfortunate controversy arose as to the diagnosis and, as a result, Dr. Walter M. Dickie, director of California Department of Public Health, requested the Surgeon General, U. S. Public Health Service, to send an officer of the Service to Imperial Valley to establish definitely the diagnosis. The report rendered to the Surgeon General stated "that there was more or less follicular conjunctivitis, but there was also a substantial amount of trachoma." The report also stated that there had been trachoma in Imperial County for many years, existing to some extent in the early Mexican population and increased by the addition of settlers and migratory workers from other southwestern and southern states.

* Report of the Committee on Conservation of Vision, Conference of State and Provincial Health Authorities of North America, Dr. W. L. Cogswell, Chairman.

In February, 1925, the health officers of Imperial County requested a complete survey of the trachoma situation and the findings of that investigation form the basis of this report.

Imperial Valley is an intensive agricultural district in the southeast portion of California between the Salton Sea and the southern boundary of California. Its limits extend approximately forty miles north and south and twenty-five miles east and west. This district is reclaimed desert land, irrigated by Colorado River water brought in by the Imperial Canal. Strictly speaking, Imperial Valley also includes territory across the International boundary. The Valley for the most part lies below sea level. The ground surface has a general slope of about one foot per 1000 feet, the lowest section being 170 feet below sea level. The soil is composed of alluvium from the Colorado River.

The climate is torrid during summer season, the noon temperature averaging over 100° Fahrenheit and occasionally reaching 130° Fahrenheit. Rainfall varies from 0 to 10 inches per year, averaging possibly 3 inches per year. Dust, dirt and the excessive sunlight of the Valley undoubtedly play a part in producing favorable conditions for the invasion and development of the trachoma infective agent.

Incorporated cities within the Valley are El Centro, Calexico, Imperial, Holtville, and Calipatria, having a combined population of about 30,000. Unincorporated districts include Heber, Westmoreland, Seeley, and Dixieland, having a total population of about 600 persons. During harvest seasons the Valley is said to have a floating population of about 10,000. The rural district population is approximately 20,000, which means that nearly 50 per cent of the Valley's population is outside city limits and settled unincorporated districts. This ratio of rural to urban population is unusually high.

Investigation.—Before undertaking the survey, it was definitely determined what was to be considered as trachoma. Trachoma, in the sense in which it is used in this report, is regarded as a pathologic entity; it is regarded as an entity which exists in acute and chronic forms; it is specific for one kind of tissue; it is usually spread from the infected to the non-infected; and finally, the disease has the appearance of an infectious process.

Trachoma was considered positive when the conjunctiva was found studded with granules and marked by papillary hypertrophy; the mucous membrane conjested, hyperemic and excreting a mucopurulent discharge. In the more advanced cases, thickening of the tarsal cartilage, particularly of the upper lids, cicatrization, follicles

or granules showing degeneration and necrosis, entropion, trichiasis, pannus, and xerosis. The latter conditions were found only in older adults where treatment had never been instituted, or had been neglected.

In conducting the eye examinations a numerical classification was followed. A normal eye being indicated by *One;* a slightly inflamed eye by a *One Minus;* a definite conjunctivitis by a *One Plus;* an early trachoma by a *One Plus Plus*, and more advanced cases by a *Two.*

A total of 8,448 pupils were examined, of whom 558, or 6.6 per cent, were found to have trachoma in some stage of the disease. Of the total 558 cases of trachoma, 95 showed involvement of one lid, 152 involvement of the lower lids, and 311 showed involvement of the upper and lower lids of both eyes. The recent research work of Noguchi with animals seems to indicate that in some instances the disease may remain stationary in one eye, but in most instances the other eye soon becomes involved.

Among the school children examined, trachoma with a marked mucopurulent discharge and photophobia was not observed in localities where clinics had been operating and pupils kept under a routine plan of treatment. In cities where clinics had not been established the disease was found in the more advanced forms. In homes among the pre-school group and adults who had not received treatment the advanced cases were the rule. Multiple cases in one family were often found. A child in one school room with trachoma was frequently found to have one or more brothers or sisters in another room affected with the disease. In the homes, a father or mother was on several occasions found with the disease advanced to blindness. Six months' old babies as well as infants a few years old were found with the disease. The disease is one of schools and homes and is emphasized by Krimsky who states that it spares "neither the infant at the breast nor the child at school, nor the worker in the field and shop."

A few cases of trachoma were found among the better classes of society, but social conditions appear to have a significant part in the number and severity of the cases in a school or family. The percentage of trachoma was lower in schools where the children came from homes where the rules of cleanliness and simple hygiene are observed and where overcrowding and lack of proper nourishment do not prevail. Dr. Royer has drawn attention to the prevalence of trachoma among the undernourished and even considered the possibility of trachoma's being primarily a deficiency disease. The diet

of the entire population is liberal, including fresh fruit, fresh vegetables, meats, sugar and milk.

Race, age, and sex do not appear to be an important factor. The negro in this series of cases probably shows a higher rate of infection than previously reported. This may be accounted for by the fact that only school children of the negro race were found infected, the adults at home showing no evidence of the disease.

In addition to the 558 trachoma cases, 118 pupils showed definite conjunctivitis and 102 pupils showed some irritation of the eyes—the latter usually being due to foreign bodies such as sand, small insects, or eyelashes—and received treatment at the time of examination. Cases of definite conjunctivitis were classed as being suspicious of trachoma and were placed under palliative treatment. A number of such cases were in a later investigation found with definite trachoma. Commenting on trachoma in Palestine, Krimsky remarks, "I have on numerous occasions observed all the evidence of trachoma in a conjunctiva after an attack of Koch-Weeks inflammation where previous to the conjunctivitis the mucous membrane had been perfectly normal. Similarly have I observed cases of trachoma, moderate or dormant, becoming severely aggravated by an attack of conjunctivitis. This is particularly noticeable with the onset of summer and the rise in temperature."

Similar conditions exist in Imperial Valley. The so-called "pink eye" usually begins in epidemic proportions in May or June, and continues until late September or early October. During surveys made in September, hundreds of cases of conjunctivitis were observed and many of the old cases of trachoma were found greatly aggravated. The gnat, which is an invariable pest during the summer, was frequently found in the eyes of children and adults suffering from "pink eye." This insect swarms about the cattle and its relation to the transmission of "pink eye" of cattle to that of humans is a problem for investigation.

The statistics by school districts indicate that Brawley and Calexico have the greatest number of cases of trachoma. These two towns have not engaged in active control measures. The other incorporated and unincorporated cities have, since 1925, had their cases under treatment or excluded from school.

Since the first clinic for treatment of trachoma was started in 1923 between 500 to 600 cases of trachoma have been operated upon. All operations were performed by an ophthalmologist and received postoperative treatment by him for a period of two weeks, when the cases were referred to the public health or school nurse, who, under

the supervision of a physician, continued the treatment as outlined by the operator. After-treatment is of greatest importance as it is not uncommon to find among those operated, lesions still active a year or more after operation. The spontaneous cure of trachoma cases was at times observed and as explained by others is undoubtedly due to the regenerative powers of the young conjunctival mucous membrane.

Conclusions.—In viewing the trachoma situation in Imperial County especially and the State as a whole, there are several problems to be comprehended.

1. There is the Mexican problem. It is stated that 33 per cent of the total population of the County is Mexican. New cases must be expected to be imported across the border and secondary cases develop in the families and schools. In the towns, people of this class have separate villages and schools. The personal hygiene in the schools can be supervised but it is in the home where treatment and education are required.

2. Cases are imported from other states. During this survey families who had been in California less than two months were frequently found to have trachomatous children in school. Interviews with parents of those pupils generally brought forth the information that some or all of the family had suffered from some form of "sore eyes" at their previous homes.

3. The Japanese problem is not a serious one, since people of this race appreciate the seriousness of the disease and are prompt in seeking medical aid.

4. The Mexicans and the average whites coming into Imperial Valley have migratory habits. They follow the crops within the County and it is not unusual for a family to live in three or four school districts within the year. At the close of the crop season in Imperial County, the migratory laborers follow the crops northward, working in several counties and returning south in the early fall or winter. Trachoma is thus transported up and down the State, the infected coming in contact with the non-infected and being ignorant or unmindful of their own condition, transmit it to others.

A survey of the Indians at the Yuma Indian School located in Imperial County was not made, but on October 1, 1925 the physician at the Yuma Indian Reservation reported that there were 185 cases of trachoma among 422 Indians examined. Of this number, 103 were operated, nine were otherwise treated, and 73 received no treatment. Since the survey of February, 1925, two follow-up surveys have

been made, one in September, 1926, and one in February, 1927. The results observed during the last survey were most encouraging, especially in the rural schools. In February, 1925, there were 156 cases of trachoma in the rural schools, while in February, 1927, there were only 17 active cases of trachoma found. It must be understood, however, that all the old cases were still under observation and treatment. In the incorporated towns where preventive measures were not undertaken and clinics not maintained, the survey of 1927 shows an increase in the total number of cases and marked advances in the progress of the disease among those who had trachoma two years previous.

The insidious nature of the disease may account for the lack of appreciation of its seriousness among the general public and even among some physicians; but there is hardly any excuse for failing to recognize its infectious nature. Noguchi has strikingly illustrated the insidious nature of the disease: "Inoculated monkeys showed nothing abnormal until from two to four weeks after inoculation, when they developed a granular conjunctivitis which slowly progressed within from two to five months until the inoculated conjunctiva had an appearance strikingly like that of human trachomatous conjunctiva in the early stages of the disease. In one animal definite scar formation had taken place in about eight months after inoculation."

In May, 1927, sera from several trachoma cases in Imperial County were forwarded to Doctor Noguchi and in personal correspondence he stated that of the twelve specimens forwarded, ten gave a positive agglutination reaction to the organism isolated by him from cases of trachoma among the American Indians in New Mexico. Later, three specimens were forwarded from cases of trachoma in San Francisco. One of these was broken en route, the other two showed a positive agglutination reaction, also a positive complement-fixation reaction. In relation to the serological reactions it is understood that the work is still incomplete and that Noguchi makes no claim to the specificity of the reactions. If proven to be specific the serological reactions will prove of great value in diagnosis.

While there appears to be a growing belief that trachoma is not as highly contagious as previously considered, there is sufficient epidemiological information to warrant the statement that every child with discharging eyes is a menace to the community and should be excluded from school and placed under systematic treatment at home, and other members of the family showing signs of infection

should also be placed under treatment. With the present day abundant water supply, soap and paper towels in the schools, hygienic measures are not difficult to supervise during school hours. It is in the homes where preventive measures are most needed, not only to promote the care of those infected, but to prevent the spread of the disease to other members of the family, or to those coming in close contact with the infected.

Trachoma is fairly well distributed over the State, and anti-trachoma campaigns should be instituted wherever the disease is found. Instruction of the general public in the rules of simple personal hygiene, instructions to teachers in the simple precautionary measures, and daily treatment of the infected, under competent personnel, are measures to be desired.

Any community undertaking an anti-trachoma campaign should be informed that it is not a measure to be completed in a few months, but one which requires sincere and untiring efforts extending over a period of several years.

Acknowledgment.—Due acknowledgment is made to Dr. L. A. House, county physician, the several health officers of Imperial County, and the physicians and public health nurses for their co-operation in establishing means of control and prevention of trachoma in Imperial County.

Discussion

CHAIRMAN WILDER: The subject will be open for discussion and I will call on Dr. Cogswell to open the discussion of the subject of trachoma.

DR. W. F. COGSWELL (Secretary, State Department of Public Health, Helena, Montana): Contrary to some belief, I am not a hereditary chief of the Blackfoot. I am a chief by adoption. If I were a hereditary chief, embarrassed as I am before you, I would be sitting in the tepee surrounded by my squaws and living a life of happiness and contentment.

Dr. Royer, in making his opening speech this afternoon, referred to this Committee for Conservation of Vision having been revived after a period of quiescence. I want to tell you that probably Mr. Carris is more responsible for the revival of that committee than any other person. In April, 1925, my State Board of Health instructed me to get busy on trachoma. They had heard rumors that there was a great deal of trachoma on the Indian reservations in Montana and they asked me to get busy. I asked them how I could get busy without any money. They said, "Well, make a noise anyway." So when I came down to Washington for the Convention of State Health Officers, I called upon Commissioner Burke. While I

was talking to Commissioner Burke, in came Mr. Carris, of the National Committee for the Prevention of Blindness, the first time I had ever seen him, and Dr. Spinden of Harvard, on the same errand for which I was there, that is, to discuss with Mr. Burke the trachoma characteristic among the Indians. While we were there a bishop from Arizona came in on the same errand. Here the four of us met, Montana, Arizona, Massachusetts and New York. We met there without any prearrangement to discuss with Commissioner Burke this one question.

I persuaded them after talking with them, to meet the Executive Committee of the Conference of State and Provincial Health Officers. They did and they discussed the question of trachoma and, as a result of that discussion, this Committee was reorganized and on account of the fact that I made the noise. I think they put me in as chairman without any qualifications except that I was interested in the work. Knowing my shortcomings, I asked Dr. Chesley to act as Secretary because he knew all about the question, and I asked Jim Hayne, of South Carolina, to act as Vice-President.

As a result of that conference with Commissioner Burke, we got a survey of trachoma on the Indian reservations in Montana. It was a rough survey but the estimate at that time was that about twenty-five per cent of the Indians on our reservations in Montana were suffering from trachoma. We had at that time 13,000 Indians and that would give us over 3,000 cases of trachoma. I think it was rather large.

Since that time the Indian Service has been more or less active in Montana. They have had Dr. L. Webster Fox out there two summers operating, giving clinics, instructing the Indian medical men on his operations for trachoma. On the Blackfoot Reservation (my tribe) an examination of the school children was made in the town of Browning, an incorporated town and under State control. About 60 cases of trachoma were found among the school children, quite a number of them whites, and a good many of them breeds. We issued an order for the exclusion of all children suffering from trachoma from the schools first, providing that they could be operated on free of charge. We had a little discussion at that time about the diagnosis. You know, the ophthalmologists sometimes disagree on trachoma. I think the chairman mentioned that fact. I have heard it said that there was once a town where the ophthalmologists all agreed on trachoma, but it was a long, long time ago and in a far away country.

However, we got all the children operated on in that school of Browning. Promptly, we tried the same thing on a Peake reservation. We issued another order and we got them all operated on but one and that was the Mayor's son. The Mayor would not allow his son to be operated on. He did not believe in what the Indian doctor said, so he sent him down to a neighboring state, to the town of Minot, North Dakota, and he was entered in the school in Minot, North Dakota, examined by three specialists (ophthalmologists) and they told him that it was not trachoma. They let the boy go to

school. All the other cases in Poplar were operated upon and allowed to go back to school. This child was allowed to go into another State and go into the schools there. I saw the child and while I do not set myself up as an ophthalmologist, I saw the child after a year's treatment in Minot and if we have trachoma on the Indian reservations, that child had trachoma, in my opinion.

The trachoma question in Montana is a serious one. We have no money and it occurred to me while I have been attending these meetings here, what a wonderful work this National Committee for the Prevention of Blindness is doing. It surprised me and I want to thank this National Committee for giving us an invitation to come here to get the enlightenment which we have. These other fellows like Chesley, may have known all about what you are doing, but I did not and I appreciate it very much.

I wish you would extend your activities out into our section of the country. I believe you could well put on a demonstration out there to help us in trying to handle the trachoma question.

We are trying to organize a little unit out there in Montana. We have seven reservations in Montana. Six of them are closed reservations. We want to carry on a trachoma campaign, but we want to carry on at the same time a general public health campaign. So our plan is, as fast as possible, to organize full time health units around these Indian reservations. At the present time, I am negotiating with the Indian Medical Service, the United States Public Health Service, Rockefeller Foundation and we have taken it up with the County and City of Hardin, who will all go in together and establish a unit there to do trachoma work as well as the public health work. The only obstacle at the time was the Mayor of the County seat. Fortunately, or unfortunately, of course, he opposed it but the other day he was sent to Rochester for an operation and he died. So I think it will go over.

I do not know as I have anything more to say. I visited in California through the courtesy of the Rockefeller Foundation just a week ago and I met down there Dr. Halloway, the epidemiologist of California, and I was talking to him about the trachoma question. The doctor has done some splendid work down there. The report of the survey of the amount of trachoma in the Imperial Valley, I believe, has been a valuable addition to this meeting.

CHAIRMAN WILDER: The next speaker listed on the program is Dr. Don M. Griswold, Deputy Commissioner, State Department of Health, Lansing, Michigan, who is ill and cannot be present. Dr. Royer has some remarks to make in regard to his discussion.

DR. ROYER: In a meeting of this conference, Dr. Chesley was good enough to send a telegram of sympathy to Dr. Griswold over the loss of his appendix. I am not going to say what Dr. Griswold would have said here, but I do have a letter in my hand which I would like to read, from Dr. Stucky. He has been working almost as long as any of the men in this room have been working on this problem. He says:

"I am very much disappointed not to be with you today and wired you this morning hoping I would be able to leave tonight.

"I was very anxious to see you and Dr. Lewis and the rest of our congenial and interested party, also I wanted to take part in the discussion assigned me.

"For the past few months I have been checking up on my old and complicated cases of trachoma, some of which I reported last year. My conclusions are more confirmed than ever that the disease is of the deficiency group, and a balanced diet with the addition of Vitamin A and D indicates that these two factors play the most important part in the kind of cases I have. But what is a balanced diet in one case is not a balanced diet in another, and the aid of a well educated and thoughtful dietitian is a great help in the feeding of these cases. Observation of my results in complicated cases for the past two or three years, where the patients have rigidly adhered to the treatment outlined for them, have been so satisfactory and so free from the usual sequelæ that I no longer dread them as I formerly did. I have had cases with the complications of keratitis, trichiasis, adhesions and unmistakable xerosis—three such cases—the results have been as surprising as they are gratifying and almost spectacular, after four to six months. Relief of the trachomatous condition, and improvement of from 40 to 60 per cent visual acuity. Best of all they are so happy it is a benediction to see them. I mention these three cases because they are past middle age and of the kind in which I have never seen such results, in my experience with similar cases in the past twenty-five years. By the way, ordinary yeast is a most valuable adjunct in many of these cases. I still think trachoma belongs to the 'malignancy' group—and early surgery (grattage with gauze) followed by proper nourishment is the best we have now. I hope Dr. Noguchi finds the 'specific bug.'

"I hope you or one of your party will write me fully about the meeting. I am deeply interested and regret more than I can say my inability to be there. I wonder if Dr. Lewis is with you. I have not heard from him for several weeks and do not see his name on the program."

Dr. A. T. McCormack (Louisville, Ky.): Following the splendid survey made by Dr. McMullen in the year following 1912, in Kentucky, where for three years, on foot and on horseback, he went into thousands of homes, literally, homes of these mountaineers who had never seen the outside; and he estimated, I believe, the number of cases in Kentucky between fifty and sixty thousand. I think his estimate at that time was as accurate as it could have been made but it was distinctly only an estimate. I would like very much to tell of the help that has been extended to us by the National Committee for the Prevention of Blindness. It has been largely moral, but it has been extremely helpful in its consideration of the subject and in its support.

I want to tell you very briefly about the results in the one county which was affected the worst probably of any of our counties—a remote mountain county without railroads, without roads, and at

the beginning almost without schools. The first work done by Dr. Stucky was done in this county in connection with one of the settlement schools whose superintendent and founder, Miss Stone, was a trained nurse and saw the serious situation without exactly knowing its character, which he with his trained, skilled vision saw needed to be controlled. His visits were a result of her solicitations at the beginning, from a section from which at that time practically nobody had come out unless they were sent to the penitentiary or some other place for punishment for their sins, consequently very little was known about it. The U. S. Public Health Service had its hospital there four years. During this time, in the hospital and in the clinics, more than 4,000 cases were operated on, that is, nearly half the population of the entire county.

All of these people, in addition to having trachoma, and practically all of those who did or didn't have trachoma, had hookworm infection, round worms and other intestinal parasites that are known in our section of the country. Sanitary conditions were primitive. They were all eligible sons and daughters of the Revolution, for they had their original land grants that had been given to their ancestors for their effective work during the Revolutionary War. They are of good stock, generated in this county where they have been living a hundred years. They had no community organization. They had the governmental organization of the English shire of the 17th century where everybody did everything that was done, by themselves, but did nothing for anybody else. They had one doctor in the county during most of these years, occasionally two. About one-tenth of the entire population were operated under arrest, under the state law in Kentucky which authorizes the county board of health to bring anybody suffering from an infectious or contagious disease under prompt and efficient treatment. The sheriff went out and they were operated upon under durance. They were glad they were. They didn't object to it particularly. They just didn't come because the Kentucky type of trachoma has pigeon-flight and he lights quickly when he starts. For that reason, it was necessary to have some form of compulsion to bring them to operation.

The hospital stayed in the county seat for eight years. The clinics were held in every part of the county in addition. Patients were operated upon under both circumstances and, as an aside, I want to submit (I know Dr. Wilder and Dr. Jackson will appreciate the point I am making) that the most serious difficulty we have had in overcoming trachoma in Kentucky has been the inaccurate knowledge of the ophthalmologists that trachoma is incurable. In fact, they have thought it could not be cured in all parts of the world and that has been a permanent and consistent handicap.

We have had a complicated system of after-treatment which has been almost worthless. In my own county of Warren, sixty-four cases were operated upon. Warren is one of the best counties in the State. These cases were operated upon in my own hospital, many of them under arrest. One of them was the acting

mayor's daughter, and His Excellency, the Mayor, was parading out in front of the hospital with a gun to get me if Dr. McMullen's operation wasn't successful. His daughter now has several children of her own and is very happy over her cure. The grandmother, from whom she had contracted the disease, had lost her eyesight as a result of trachoma.

We have had three surveys made in our first county. I think it is one of the most gratifying results of a public health campaign along a particular line that has ever happened. In this county, at the time this work was initiated by Dr. McMullen, the total income of the county was less than $8,000 for all purposes, education and everything else and that county now is supporting a full-time health department and is spending some $4,500 toward its support from the county treasury. It is because they know what scientific medicine and scientific knowledge can do for their eyes. They believe it can do the same sort of thing for the other parts of their bodies. One of the best venereal disease clinics we have is in that county. In that county, as a result of these re-surveys, we now know definitely about conditions there; we have a card index of every case that has been operated upon in the county. We know where the patients are who are still there, and some of them have moved, but we know definitely what has happened to them and there is not a single active case of trachoma in the county today. The health officer of that county was an assistant director of our Bureau for the Prevention of Blindness, and knows the disease and operates himself, and, in his survey of the schools this year, with the invitation to the school children to have every case that had anything the matter with its eyes present, he was unable to find one case of active trachoma. There are some forty patients in the county who have to go back to the hospital, occasionally, for anatomic defects that have to be operated upon for cosmetic effect, but there is no active trachoma in that county. Those people have become economically self-supporting because they have been freed from the incubus of this terrible disease which, before this time, had them in the worst condition of slavery, that to incurable, chronic disease.

I believe that the lesson of this county has not been sufficiently generally made public. I am just as confident that there is no other section of the world that cannot, by the same action that was taken there, the same action that Drs. McMullen and Mossman have carried on so splendidly in many other sections of our State, be freed from trachoma just as effectively, just as soon as we are freed from the misconception that it can not be cured at all. These cases were as serious as any cases have been anywhere. In a number of our counties, where we had fewer cases, they have been entirely freed of the disease. In Mason County, which has the second of our full-time health departments, the health officer himself operated on all the cases that were in the county and that county is entirely free from the disease. We have a number of other counties where this is true.

In Pike County, the new health officer, who has gone in as a missionary from China where he came in contact with the disease, in its worst form in all probability, in making a re-survey of all schools in Pike County (he has only finished about a third of the schools at the present time), hasn't been able to find a single case of trachoma where formerly we had at least half of the children out of school on account of this one disease.

We are quite definitely certain that trachoma can be eradicated and one of the things I would like very much to do is to ask this Committee to hold one of its sessions either in Lexington or Richmond, where we have our present trachoma hospital, where this work can be emphasized, because I do not believe there is anything better this organization can do, and it has done so much, as you have seen in these few days that we have been meeting here. Those of us who are familiar with this work and know so much has been done, believe the time has come when trachoma should be eradicated from the world.

I believe the method for doing it has already been devised and it is only necessary to make it known to do it. We have at Richmond, conducted by the United States Public Health Service, a hospital that I would like you to think about a moment. In 1809, in Danville, Dr. Ephraim MacDowell did an ovariotomy, the first time it had been done. This was a little village of some 300 people. His granddaughter died six years ago in Richmond and willed to the State Medical Society her home and the fifty-two lots on which it was located in the city of Richmond for such humane purposes as the medical profession of the State desired to use this property, as a memorial to Ephraim MacDowell. The State Medical Society has loaned it to the State Board of Health which has asked the United States Public Health Service to conduct in it the trachoma hospital. It was extremely fortunate that just at this time Dr. Royer, who has helped us in many other ways in our campaign, advanced his theory in regard to the possibility of there being a dietary disturbance. The property was left to us on condition that it could not be used except for non-contagious diseases. However the State Board of Health of Kentucky, following Dr. Royer's lead of accepting the dietary diathesis for the disease, is treating it on that basis. We give all our patients cod liver oil and they get well.

There is one thought that ought to be on record that the ophthalmologists need to know and that is, when the operation is done properly and all the trachomatous nodules and defective areas are removed, the case is well. Whenever it recurs, it is because the operation wasn't done completely. That is the only reason. You can tell the next day, as well as any time after, whether it has been done properly or not. Getting rid of trachoma is like getting rid of Johnson grass. You have to dig up the ground in which the Johnson grass is growing, burn the whole thing, dirt, seed, grass and all, and when you have done that, there is very little inflammation, very little after-effect. You can give patients a little more grease to put on their lids or not. They get well just the same. It is more

humane to have them in the hospital. It is more effective, especially in the complicated cases, far more effective, to have them in the hospital, because there you do have to follow up some after-treatment. Where trachoma is cleaned out thoroughly, these cases get well.

Two weeks ago we had the health officers from three of the Australian states in Kentucky through the courtesy of the Rockefeller Foundation and we took them through our hospital. I don't believe I have ever seen three men more impressed than they were with the character of this operation, but the chief reaction was that it was possible for a Government to survive that permitted men to suffer with such a disease over six, seven or eight years, as a great many of these patients whom they saw, had gone that long without having anything done for them. They said in Australia the Government would have been thrown out of office because they realize in Australia their gold mines, extensive pastures on which sheep are grown, their material resources have been there for years, some thousands of years, and that the human element in Australia is the important thing because it is developing those natural resources.

In America we have not reached the point where we realize our human accounts are as good as our other resources. It seems to me it is up to us to show the world we realize this.

CHAIRMAN WILDER: If you will allow the Chairman a few words before closing, he would like to say that the statement of Dr. McCormack in regard to the treatment of this condition is altogether too rosy and should not be allowed to go unchallenged. The method he describes as the one used on the Kentucky cases so extensively, the so-called grattage, is practically the same as that used by ophthalmic surgeons on suitable cases everywhere. It is unquestionably of benefit, but in estimating its value we must be careful to differentiate the kind of case we are treating, whether it is one of real trachoma or the benign form of follicular conjunctivitis. The latter will get well very promptly either with some form of grattage or with other forms of treatment less vigorous. The real trachoma is more obstinate, is liable to recurrences and pannus complications and is likely to result in scar formations, and deformities of the lids. I have seen some of these cases in Kentucky and I know there must be a great number of the benign form of simple follicular conjunctivitis or they would not get well as promptly after simple treatment as Dr. McCormack describes.

DR. MCCORMACK: I would like to have this organization meet in Kentucky because I would like to have you see the cases of trachoma there that are being operated upon.

CHAIRMAN WILDER: Is there any further discussion on this subject?

DR. ROYER: Just for the purpose of the minutes of this session for future reference, I would like to suggest some mention of the study which has been made this last summer of the Klamath River Indians by the National Tuberculosis Association and the American

Social Hygiene Association in co-operation with Indian Bureaus where particularly successful work has been done in getting a large percentage of both the men and women of the reservation under general public examination. The data is not tabulated but it will be in the course of the next two weeks or so and in view of some of the comments made by the various persons who presented the papers, I thought it would be useful to know that that data may be secured and placed along with the other data.

CHAIRMAN WILDER: Professor Noguchi of the Rockefeller Institute, from material obtained from the Indians in the West suffering from what was recognized as trachoma, discovered and cultivated an organism different from any heretofore found in trachoma cases. It is a motile rod-like organism that grows on media at ordinary room temperature. He succeeded in inoculating the eyes of chimpanzees, orangs, baboons and various species of monkeys and producing an inflammation of the eye which seemed to resemble trachoma of a mild degree, with little follicles. This organism is in appearance different from the micro-organisms discovered by Koch, Prowazek or Halberstadt.

From the follicles that are caused by injecting the cultivated organism beneath the conjunctiva he is able to recover the same organism. These animals must have the disease for a long time before they will develop some of the sequelæ that enable us to say positively the condition is clinically trachoma and he still has them under observation. Some of them have had the disease now for four or five months. I saw them early in the summer and again in September and they still have this peculiar condition.

One interesting thing that helps to confirm our ideas of the contagiousness of trachoma is the following: Noguchi inoculates one eye alone and after some weeks the ape transmits the disease, probably by means of his fingers, to the other, for the same condition develops there. We find oftentimes that an individual has trachoma for some time in one eye before the other finally contracts it. Dr. Noguchi is not yet ready to say that this is specific. He is prepared to say that he has discovered an organism which will produce in apes and in monkeys, a disease which simulates follicular conjunctivitis.

I am requested to announce that at this Conference there have been representatives from seventeen states from Massachusetts on the East, Washington on the West, Minnesota on the north and Texas on the south and there have been almost 300 registrants. I should say it has been a very successful Conference.

National Society for the Prevention of Blindness, Inc.

370 Seventh Avenue, New York, N. Y.

WILLIAM HOWARD TAFT, *Honorary President*

HONORARY VICE-PRESIDENTS

Jane Addams
Thomas P. Gore
David Starr Jordan
Helen Keller
Mrs. Winifred Holt Mather

OFFICERS

William Fellowes Morgan, *President*
Park Lewis, M.D., *Vice-President*
George Blagden, *Treasurer*

BOARD OF DIRECTORS

Ellice M. Alger, M.D.
Mary Beard, R.N.
Conrad Berens, M.D.
George Blagden
A. J. Chesley, M.D.
Colman W. Cutler, M.D.
Carl A. de Gersdorff
George S. Derby, M.D.
Martha Lincoln Draper
J. Clifton Edgar, M.D.
Homer Folks
Edward F. Glaser, M.D.
John M. Glenn
W. O. Hart
Rt. Rev. William Lawrence
Park Lewis, M.D.
Mrs. Seth Low
Preston S. Millar
William Fellowes Morgan
James P. Munroe
H. F. J. Porter
Wm. Campbell Posey, M.D.
Mrs. Corinne Roosevelt Robinson
William F. Snow, M.D.
Russell Tyson
Edward M. Van Cleve
John L. Wilkie
William H. Wilmer, M.D.
Hiram Woods, M.D.

ADVISORY COMMITTEE

Edward E. Allen
Frank Allport, M.D.
H. Dickson Bruns, M.D.
George E. de Schweinitz, M.D.
Harold Gifford, M.D.
John Green, M.D.
Mrs. Hazel Hadley
Thomas B. Holloway, M.D.
Charles W. Holmes
W. H. Luedde, M.D.
Albert B. Meredith
Paul D. Mossman, M.D.
Linda Neville
Walter H. Snyder, M.D.
Marguerite Wales
William H. Wilder, M.D.
Thomas D. Wood, M.D.
Harold Vanderbilt Würdemann, M.D.
Arthur M. Yudkin, M.D.

EXECUTIVE STAFF

Lewis H. Carris, *Managing Director*
Mrs. Winifred Hathaway, *Associate Director*
B. Franklin Royer, M.D., *Medical Director*
Eleanor P. Brown, *Secretary*
Alice M. Bradford, *Membership Secretary*
Isobel Janowich, *Editor*
Louis Resnick, *Publicity Director*
Mildred G. Smith, R.N., *Staff Associate*